

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

الترم الاول



Environment	* A term is derived from the French word "Environ" which means "what surrounds us". * It is everything that surrounds us, including biotic factors (such as humans, plants, animals and microorganisms) and abiotic factors (such as light, air, water, and soil).
Ecosystem	It is a community of living organisms that interact with each other and with non-living components for adapting to the changeable conditions.
Water cycle (Hydrological cycle)	It is the continuous movement of water (on or near the Earth's surface) from one place to another around the planet in an almost closed system through many different pathways, changing between its three states (solid, liquid, and gas) within the known temperature range on the Earth's surface.
Transpiration	It is the process by which the plant gets rid of excess water in the form of vapor from the plant's surface exposed to air.
Stomata	They are microscopic openings found on the surfaces of leaves and green stems through which most transpiration occurs.
Excretion	It is the process by which a living organism gets rid of waste products resulting from metabolic processes, such as carbon dioxide, water vapor, and nitrogenous wastes (such as ammonia, urea and uric acid).

Covalent bond	A type of chemical bonds that binds between two atoms by sharing electrons where each atom shares one or more electron to form the bond.
Hydrogen bond among water molecules	An electrostatic attraction between a partially positive hydrogen atom (δ^+) in one of the water molecules and a partially negative oxygen atom (δ^-) in an adjacent water molecule.
Electronegativity	A measurement for the atom's ability to attract the electrons of the chemical bond towards itself for a longer period of time.
Hydrolysis of salts	A reaction occurs when a solid salt is dissolved in water forming an acid and a base one or both of which are weak. Water (liquid) + Salt (solid) $\rightleftharpoons$ Base + Acid
The pH value of the solution (pH scale)	A quantitative measurement with values ranging from 0 to 14, that expresses the degree of acidity, neutrality or alkalinity of the liquid or the solution.
Neutral solution	A solution in which the concentration of hydrogen ions is equal to the concentration of hydroxide ions.
Basic solution	A solution in which the concentration of hydrogen ions is less than the concentration of hydroxide ions.
Acidic solution	A solution in which the concentration of hydrogen ions is greater than the concentration of hydroxide ions.
Fluid	Any substance that can flow and does not have a fixed shape, but takes the shape of the container that holds it.
Density	The mass of a unit volume of a substance at a specific temperature.

Relative density of a substance	The ratio of the density of a substance to the density of pure water at a temperature of 4°C.
Internal energy of a body or a system	The sum of the kinetic and potential energies of the molecules of the body or the system.
Temperature	* A quantitative description of how hot or cold a body or a system is. * A measure of the average kinetic energy of the molecules of a body or a system.
Amount of heat	The thermal energy transferred from, to or within a body when there is a difference in temperature.
Specific heat of a substance	The amount of heat required to raise the temperature of 1 kg of a substance by one degree Celsius or one kelvin.
Latent heat of vaporization	* The thermal energy released from a unit mass (1 kg) of a substance as it transforms from a gaseous state to a liquid state without a change in temperature. * The thermal energy absorbed by a unit mass of a substance to transform it from a liquid state to a gaseous state without a change in temperature.
Warm-blooded organisms	They are organisms that can maintain a constant internal body temperature regardless the temperature of the surrounding environment.
Cold-blooded organisms	They are organisms that rely on external sources to regulate their body temperature.
Solution	A homogeneous mixture which consists of solvent and solute.
The colligative properties of solution	They are properties of the solution that depend on the number of ions or molecules of the non-volatile dissolved substance (solute) in the solution, not on the type of the solute.

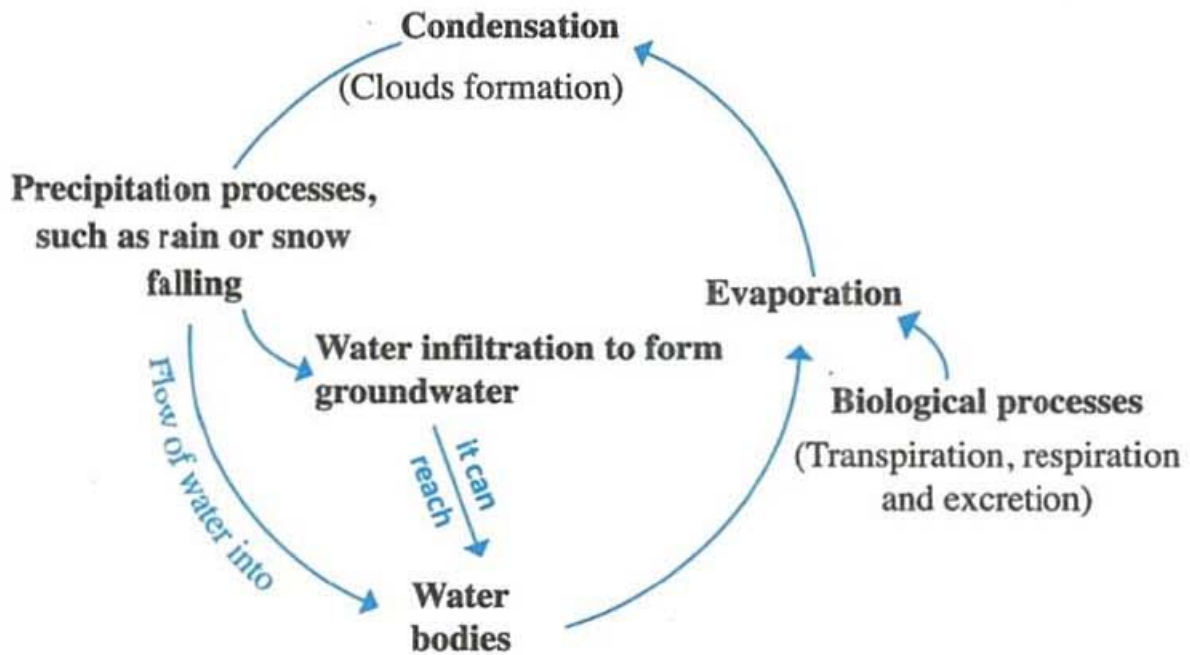
Vapor pressure	It is the liquid vapor pressure on the liquid surface in a closed container (system), when the liquid and its vapor are on dynamic equilibrium at a constant temperature and pressure.
Dynamic equilibrium	The equilibrium between the evaporation rate of the liquid and the condensation rate of its vapor at constant temperature and pressure in a closed container (system).
Boiling point of the liquid	The temperature at which vapor pressure of the liquid is equal to the atmospheric pressure exerted on the liquid surface.
Freezing point of the liquid	The temperature at which the substance is converted from the liquid state into solid state.
Osmosis	It is the phenomenon of transferring (movement) of water from the diluted solution to the concentrated solution through a semi-permeable membrane separating the two solutions.
Osmotic pressure	It is the pressure that arises in a solution due to the difference in dissolved substances (solutes) concentration between two solutions, which leads to the diffusion of water by osmosis from the low-concentrated solution (with low osmotic pressure) to the high-concentrated solution (with high osmotic pressure) through a semi-permeable membrane.
Cell	* It is the basic unit of life, representing the structural and functional unit of all living organisms. * It is the smallest independent constituent in the structure of a multicellular organism.
Prokaryotes	They are unicellular organisms whose genetic material is not surrounded by a nuclear membrane.

Eukaryotes	They are unicellular or multicellular living organisms whose genetic material is surrounded by a nuclear membrane and contain specialized organelles.
Enzymes	They are specific catalysts or activators composed of protein substances that increase the speed of chemical reactions in the cell.
Metabolic processes (Metabolism)	They are a set of continuous biochemical reactions that occur inside the cells of living organisms, taking place in the presence of water, on which the life of living organisms depends.
Activation energy	It is the minimum amount of energy required to start a chemical reaction.
Adaptation	It refers to the behavioral or physical traits of a living organism that help it to survive better in its ecosystem.
Structural (Anatomical) adaptations	They include changes in the structure and shape of parts of a living organism's body that help it to survive in its environment.
Behavioral adaptations	They include certain behaviors or actions, whether inherited or acquired, that help living organisms to face the harsh conditions or to better utilize available resources.
Physiological (Functional) adaptations	They are adaptations or modifications in the way living organisms perform their vital functions which enable them to survive in their environments.
Solubility	* It is the ability of a solute to dissolve in a solvent to form a homogeneous solution at a specific temperature and pressure. * It is the maximum amount of solute required in a specific volume of solvent to form a saturated and stable solution at a certain temperature and pressure.

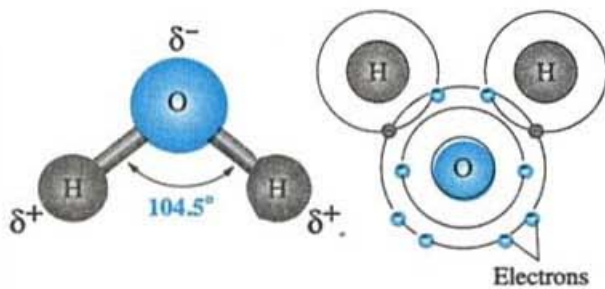
Photosynthesis	It is a vital process carried out by autotrophic organisms such as phytoplankton, algae and aquatic plants, during which organic substances such as carbohydrates like glucose are formed in the presence of light and chlorophyll. It plays a role in the production of oxygen.
Diffusion	It is the movement of molecules or ions from the medium with a high concentration to the medium with a low concentration.
Acidification	It is reducing the pH value of water as a result of forming acids such as carbonic acid (H_2CO_3) that is produced from the dissolution of CO_2 gas in water.
Calcification	It is a process that many marine organisms rely on to form their shells or skeletal structures from calcium carbonate (which is slightly soluble in water).
Gulf stream	One of the ocean currents that carries warm water from the equator towards the North Atlantic Ocean.
Pressure of a liquid at a point inside it	The weight of the column of liquid above that point acting on the unit area around that point.
Swim (Air) bladder	It is an organ in some fish that is filled with gases to allow them to control their buoyancy in the water.
Ecological balance	It is a state of dynamic stability that occurs when living organisms in an ecosystem interact with non-living components in a way that sustains the continuity of life.
Sustainable development	Meeting the needs of the current generation without compromising the ability of future generations to meet their own needs.

2 Illustrating figures and diagrams

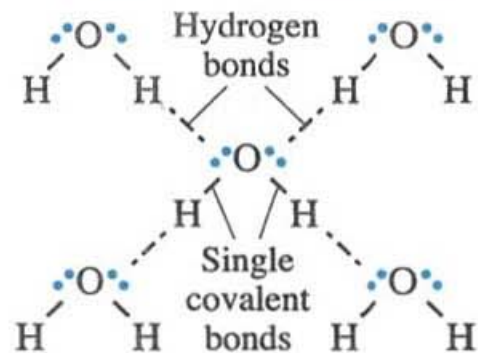
1 Water cycle in nature



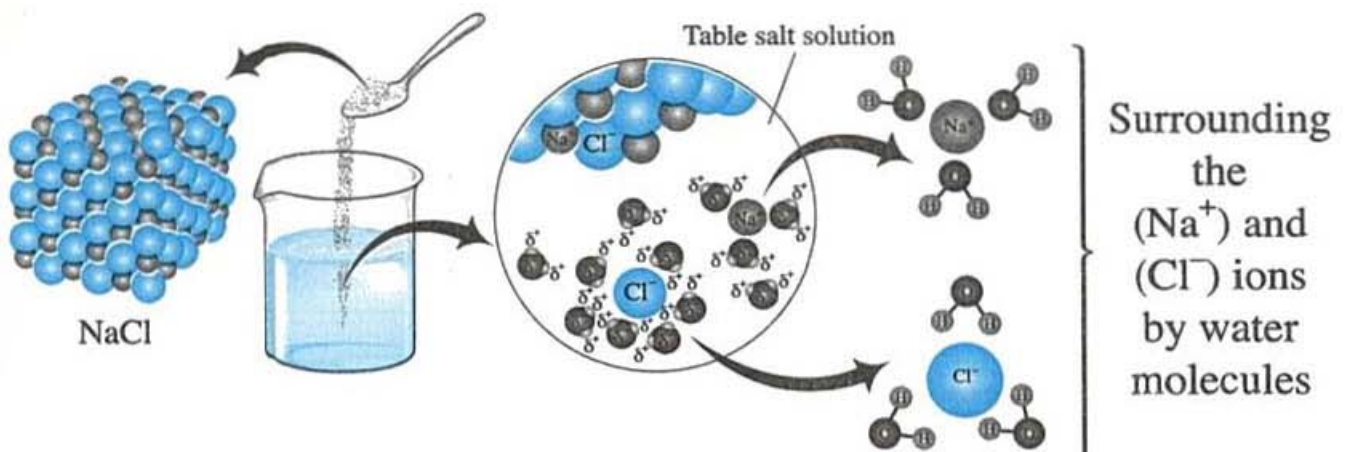
2 The structure of water molecule



3 The types of chemical bonds in water



4 Dissociation of sodium chloride salt (NaCl) in water



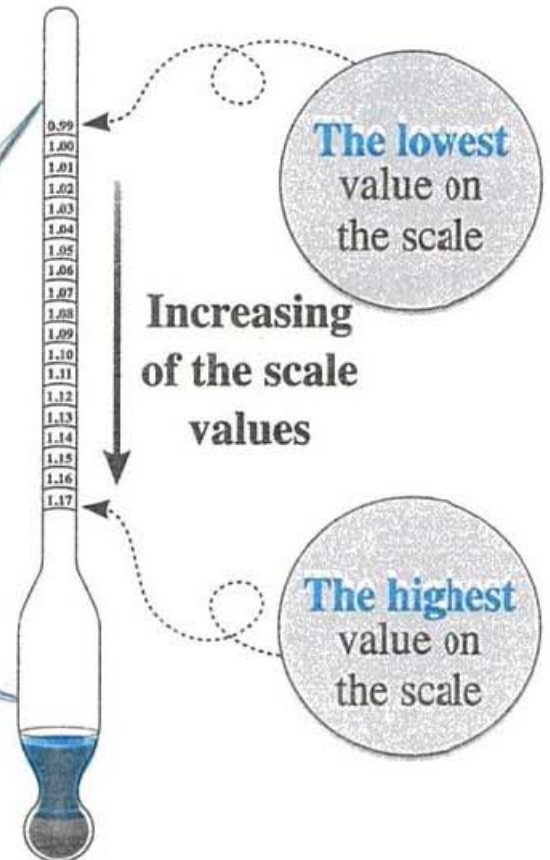
5 Hydrometer

1 A long glass stem

with a small diameter, graduated with the values of relative density or density in g/cm^3 .

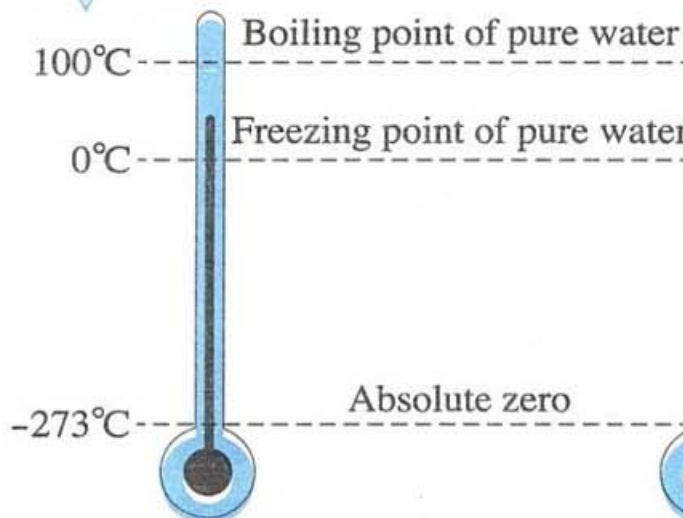
2 A cylindrical glass bulb

which is a wider hollow sealed reservoir for buoyancy, that contains at its bottom mercury or lead balls to help the device balance vertically in liquids.



6 Some measuring units of temperature

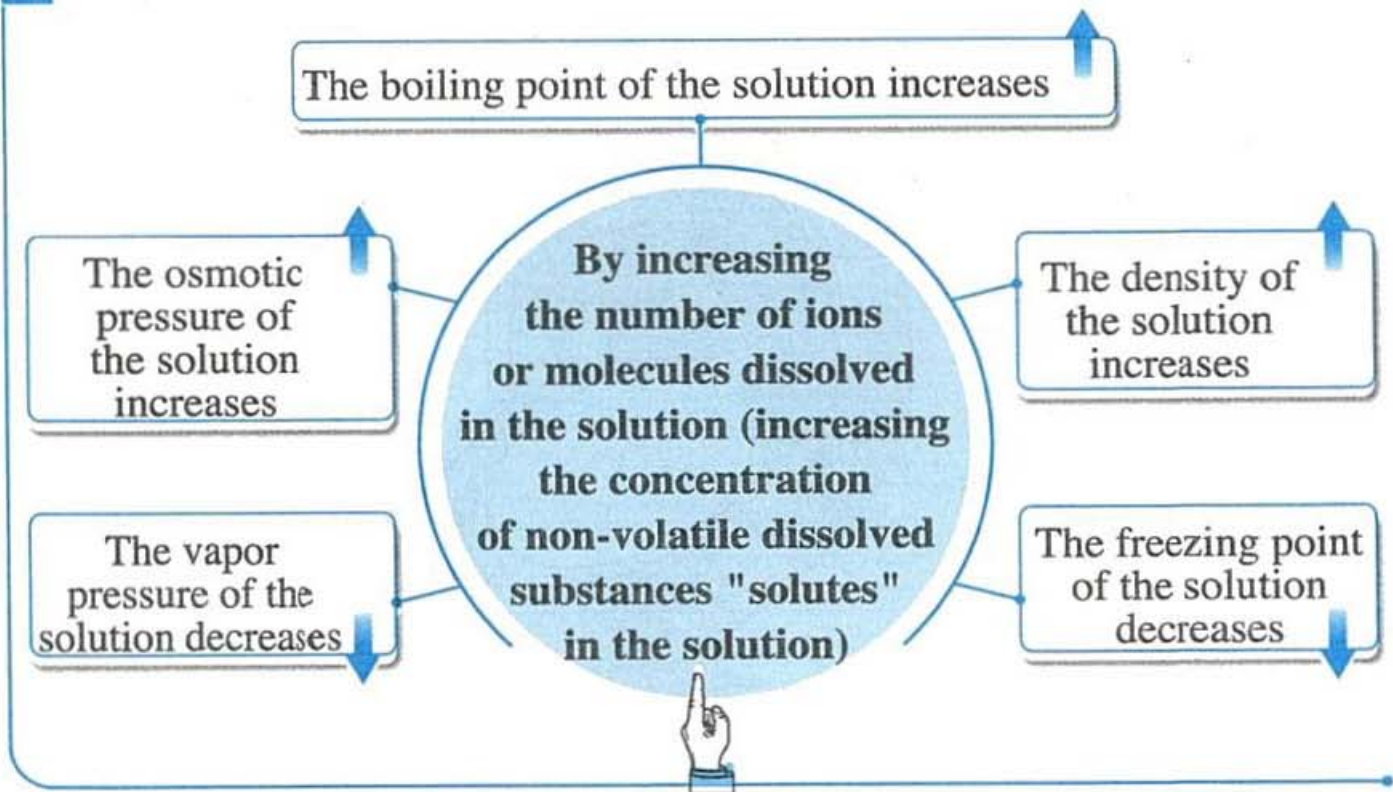
Celsius ($^{\circ}\text{C}$)



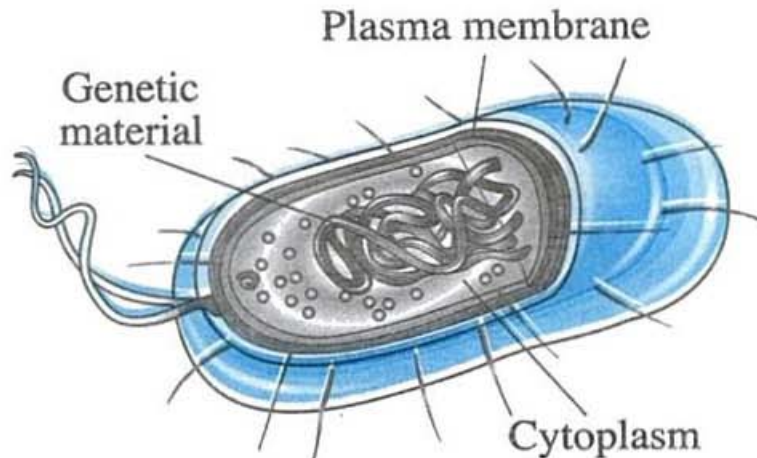
Kelvin (K)



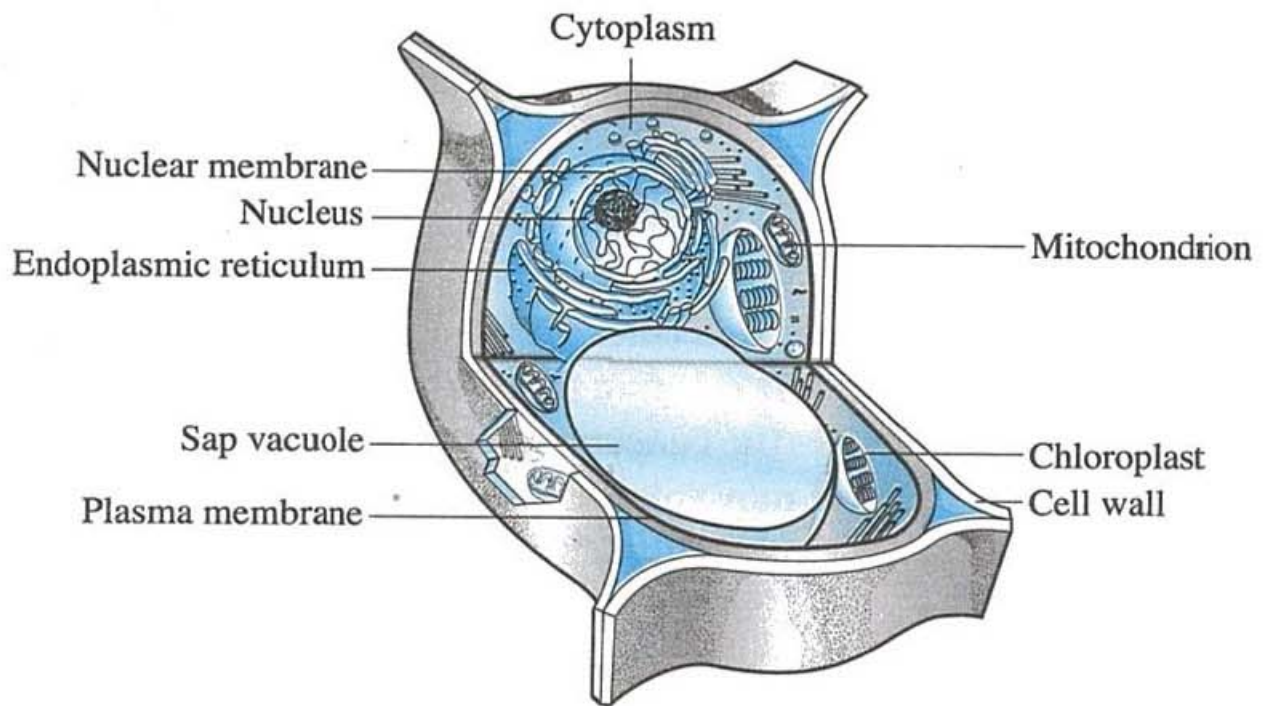
7



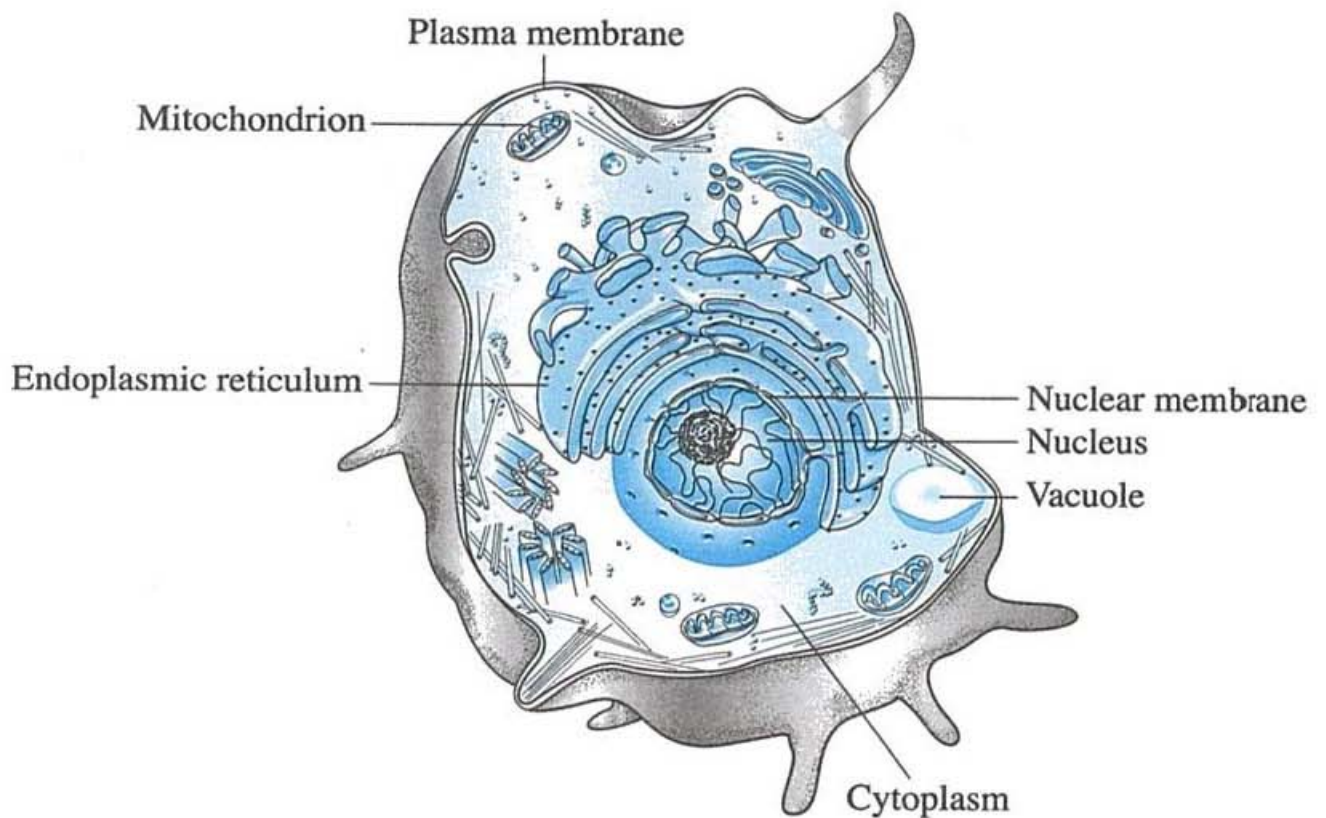
8 Bacterial cell



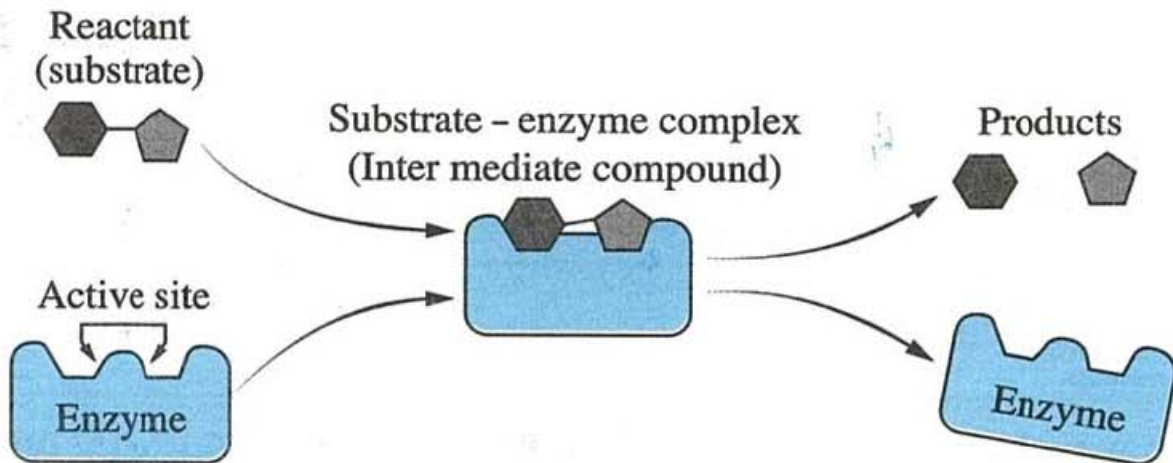
9 Plant cell



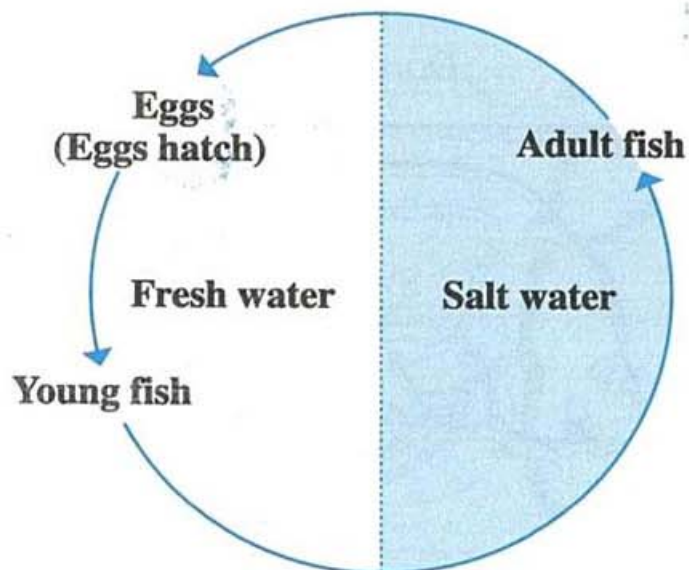
10 Animal cell



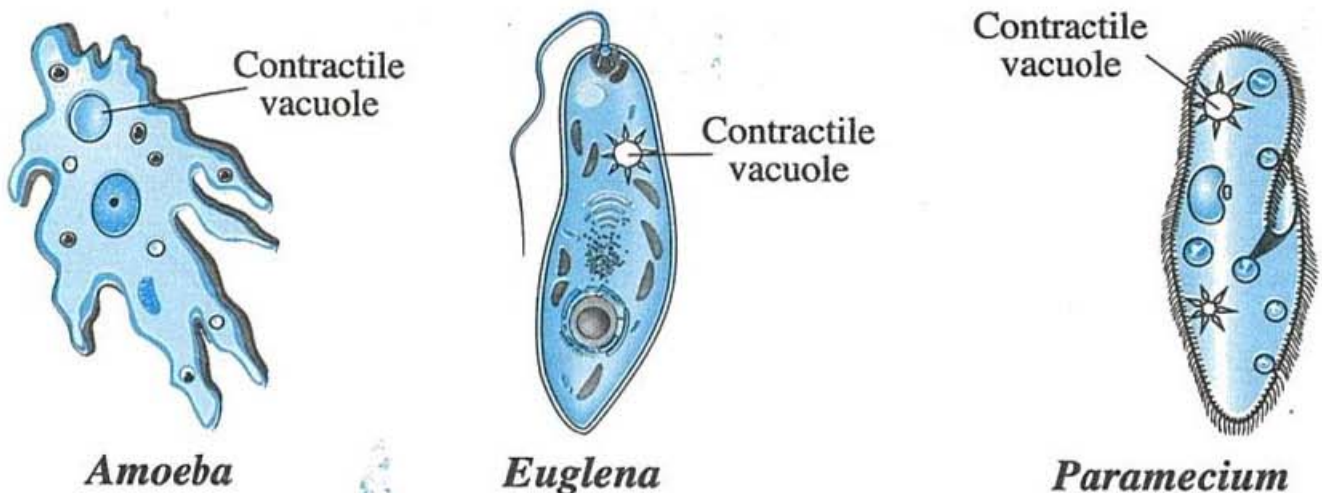
11 Mechanism of the enzyme's action [as a catalyst]



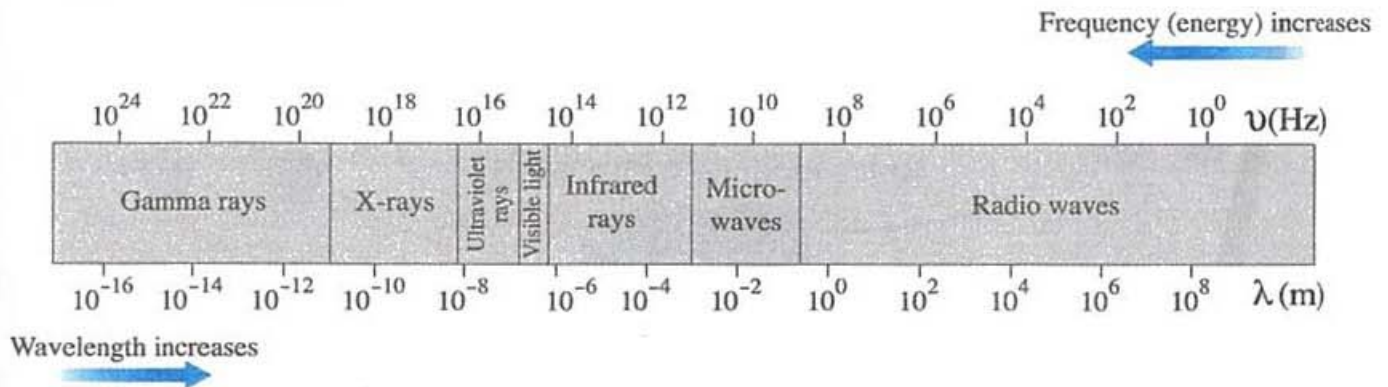
12 Life cycle of salmon fish



13 Contractile vacuole in some unicellular organisms

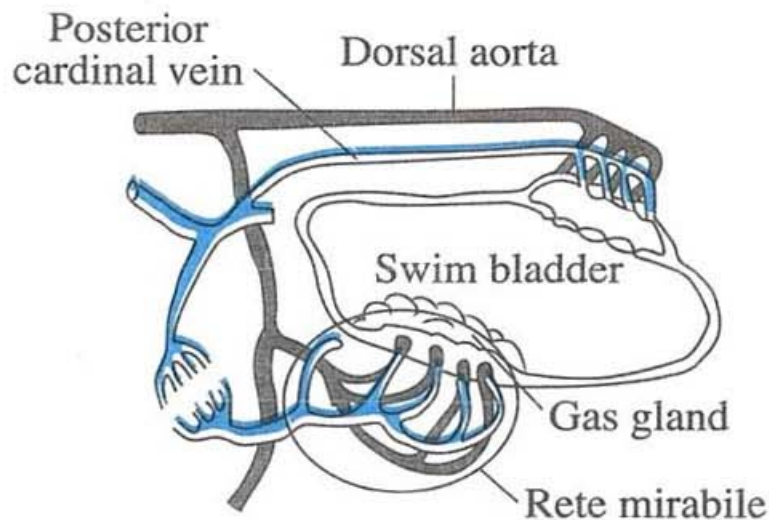


14 The electromagnetic spectrum



* The wavelengths of visible light range from 400 nm to 700 nm.

15 Air [Gas] bladder or swim sac

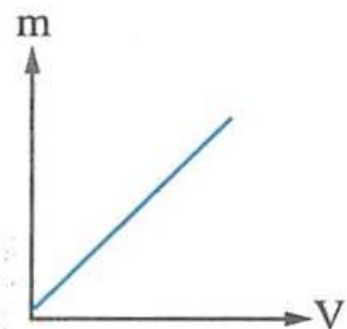


3 Graphical relations

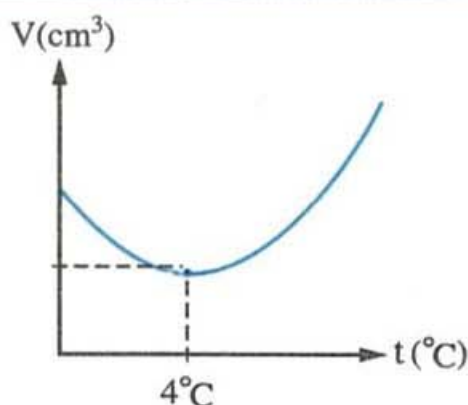
1 The relation between the mass [m] and the volume [V] for a group of bodies of the same substance at the same temperature

* The relation: $\rho = \frac{m}{V}$

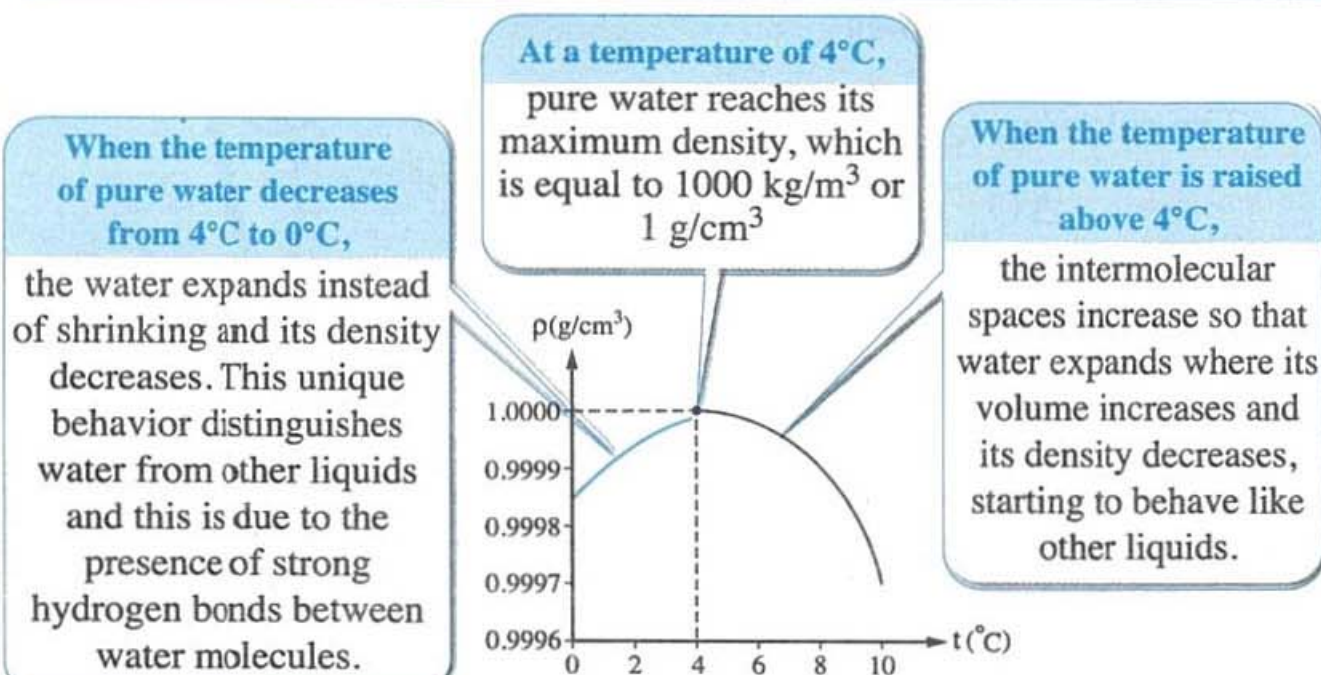
* Slope = $\frac{\Delta m}{\Delta V} = \rho$



2 The relation between the volume [V] of an amount of pure water and the temperature in Celsius [t]



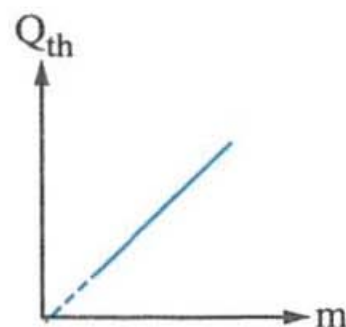
3 The relation between the change in the density of pure water and the change in temperature



4 The relation between the amount of heat [Q_{th}] gained or lost by a group of bodies of the same substance to cause the same change in temperature and the mass [m] of these bodies

* The relation: $Q_{th} = mc\Delta t$

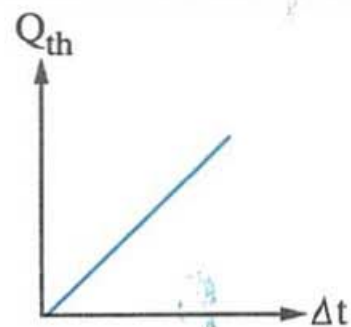
* Slope = $\frac{\Delta Q_{th}}{\Delta m} = c\Delta t$



5 The relation between the amount of heat [Q_{th}] gained or lost by a body and the change required in the body temperature [Δt]

* The relation: $Q_{th} = mc\Delta t$

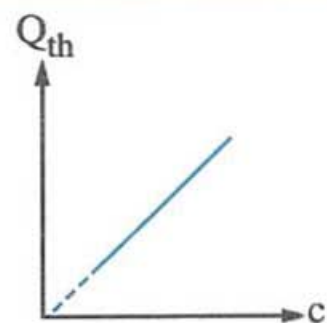
* Slope = $\frac{\Delta Q_{th}}{\Delta (\Delta t)} = mc$



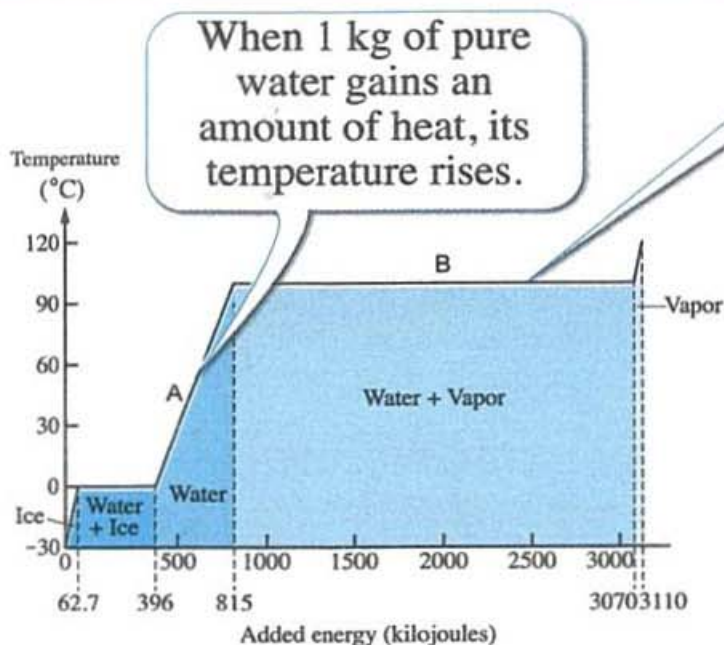
6 The relation between the amount of heat [Q_{th}] gained or lost by a group of bodies of the same mass of different substances when their temperature changes by the same value and the specific heat [c] of these bodies

* The relation: $Q_{th} = mc\Delta t$

* Slope = $\frac{\Delta Q_{th}}{\Delta c} = m\Delta t$

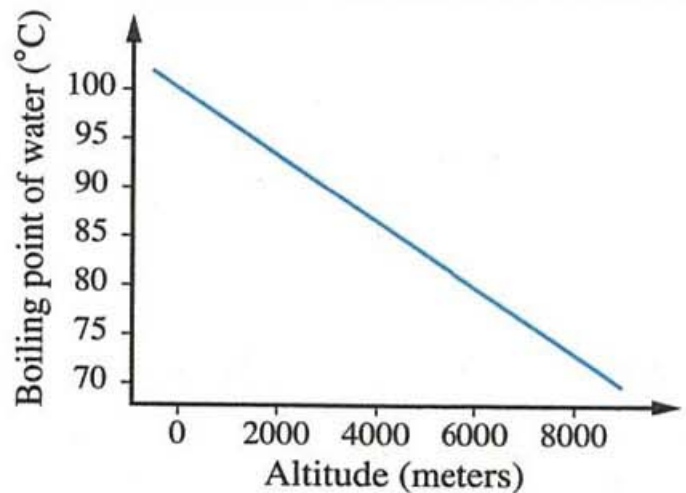


7 The relation between the thermal energy gained or lost by 1 kg of water and the temperature of the water in Celsius

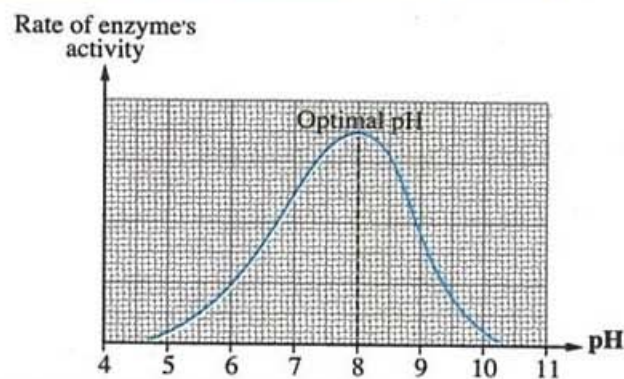


8 The relation between the boiling point of water and the altitude above sea level

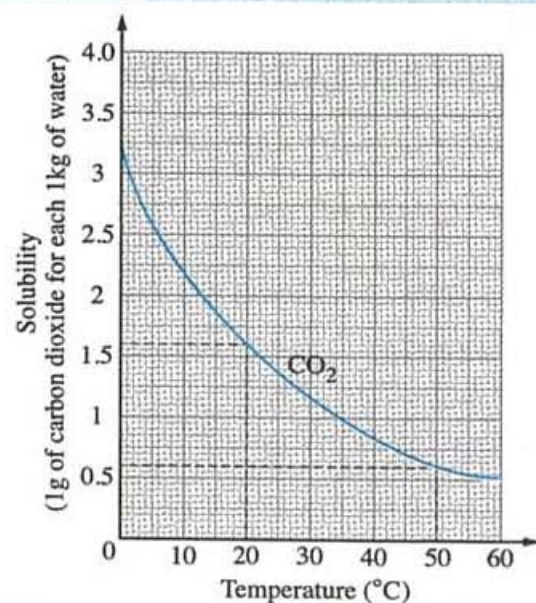
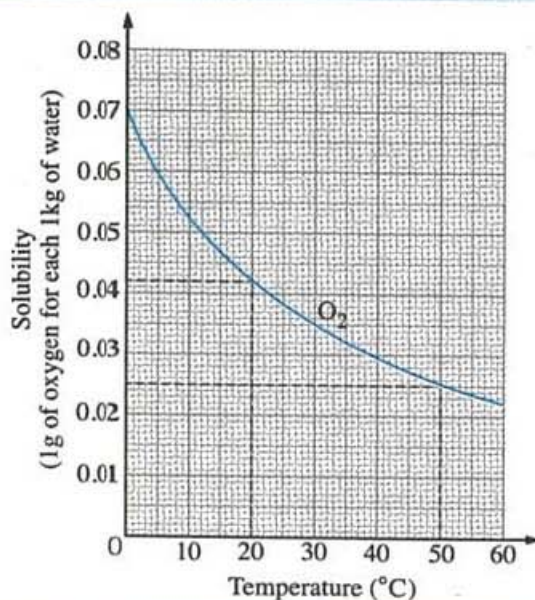
The boiling point of water **decreases** with rising above sea level due to **the decrease in atmospheric pressure**.



9 The effect of pH on the enzyme's activity



10 The relation between the solubility of O_2 and CO_2 in fresh water and temperature



The spheres forming the natural environment.	4 (Hydrosphere, Atmosphere, Lithosphere & Biosphere)
The percentage of water that covers the Earth's surface.	About 70%
The percentage of land on the Earth's surface.	About 30%
The percentage of salt water in oceans, seas and saltwater lakes regarding to the percentage of water that exists on the Earth's surface.	About 97%
The percentage of fresh water in rivers, freshwater lakes, streams, reservoirs and groundwater (that can be used for human consumption) regarding to the percentage of water that exists on the Earth's surface.	About 1%
The percentage of frozen water in polar ice caps and glaciated rivers regarding to the percentage of water that exists on the Earth's surface.	About 2%
The mass percentage of hydrogen in water molecule.	11.11%
The mass percentage of oxygen in water molecule.	88.89%
The ratio between the hydrogen mass to the oxygen mass in water molecule.	1 : 8 Hydrogen : Oxygen
The angle between the two single covalent bonds in water molecule.	104.5°
The maximum number of hydrogen bonds that a single water molecule can form with adjacent water molecules.	4

The boiling point of pure water under normal atmospheric pressure.	100°C
The boiling point of hydrogen sulphide under normal atmospheric pressure.	- 61°C
The density of pure water at a temperature of 4°C.	1 g/cm³
The density of pure water at a temperature of 4°C in SI unit.	1000 kg/m³
The specific heat of pure water.	4200 J/kg.K
Number of kingdoms of eukaryotes.	4
The percentage of water of the body mass in mammals.	About 70%
The percentage of water inside cells of the body mass in mammals.	About 47%
The percentage of water outside cells (in blood plasma and other body fluids) of the body mass in mammals.	About 23%
The ratio between the concentration of oxygen gas and the concentration of carbon dioxide gas in atmospheric air.	500 : 1 O₂ : CO₂
The ratio between the solubility of oxygen gas and the solubility of carbon dioxide gas in water.	1 : 50 O₂ : CO₂
The solubility of oxygen and carbon dioxide gases in salt water in ocean compared to the solubility of both gases in fresh water.	Less about 20% - 30%
The atmospheric pressure at sea level (standard atmospheric pressure).	1.013 × 10⁵ N/m²

5 Importance and uses

Xylem tissue	It transports water and salts from the root to the upper parts of the plant.
Hydrometer	Measuring the relative density of liquids or their density in g/cm^3 .
Peptidoglycan	It gives the bacterial cell wall its shape and rigidity.
Cell wall	It gives the cell its definite shape, encloses its components and protects them.
Plasma membrane (Cell membrane)	* It protects the internal contents of the cell. * It regulates the passage of substances into and out of the cell.
Nucleus	* It contains the genetic material that: - Determines the traits of the living organism. - Controls the activities of the cell.
Cytoplasm	* A gel-like substance that contains: - Some important chemical substances for the cell's survival. - Organelles with many vital functions.
Endoplasmic reticulum	It is used to transport various materials from one place to another inside the cell.
Mitochondria	Centers of energy production in the cell.
Vacuoles	Store food, water and excess salts.
Chloroplasts	In which photosynthesis takes place, because they contain chlorophyll substance.

Water for the living organism	* It acts as a universal solvent, allowing biochemical reactions to occur by dissolving mineral salts and nutrients, carrying gases such as oxygen and carbon dioxide to facilitate their transport inside the living organism and getting rid of wastes out of it. * It represents the main component of cytoplasm, as the presence of water inside the cell: • Enables it to maintain its shape and structure. • Creates an internal pressure that resists the pressure surrounding the cell, which contributes to: - The success of biochemical processes inside the cytoplasm. - Enabling the organelles to function properly. * It maintains the internal temperatures of living organisms stable despite its external fluctuations, due to the high specific heat of water. * It is the main factor in maintaining the internal balance of the body and supporting the complex chemical activities of life, as it directly participates in metabolic processes (metabolism).
Enzymes	They increase the speed of chemical reactions in the cells of living organisms by reducing the activation energy required to start the reaction to lower levels.
Oxygen gas in the aquatic environment	Dissolved oxygen in water plays an important role in producing the energy necessary for marine organisms to carry out various biological processes by oxidizing glucose molecules (the main source of energy) during cellular respiration process, which is known as "catabolism" and it is one of the two metabolic processes.
Carbon dioxide gas in the aquatic environment	CO₂ gas is considered a key element in photosynthesis process for the formation of organic substances, such as carbohydrates (like glucose), as shown by the following chemical equation: $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \underset{\text{Glucose}}{\text{C}_6\text{H}_{12}\text{O}_6} + 6\text{H}_2\text{O} + 6\text{O}_2 \uparrow$

Air (Swim) bladder in salmon fish	* Transitioning between different depths during their migration between seas and rivers. * Controlling their buoyancy and balance in the water.
Unsaturated fatty acids of cell membranes in deep-sea organisms	They help them to maintain the fluidity and stability of cell membranes, which prevents the cell damage.
Ecological balance in aquatic systems	* It ensures the maintenance of: - Nutrients balance. - Balance among living organisms. - Energy flow through the food web.

6 Laws and problems

1 Density (ρ) = $\frac{\text{Mass (m)}}{\text{Volume (V)}}$

Measuring unit

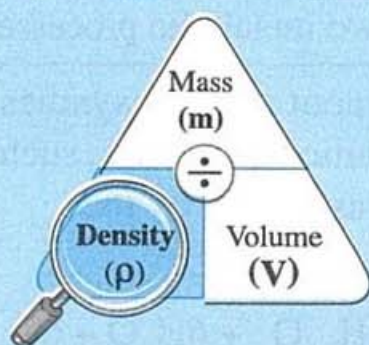
* SI unit: kg/m^3

* Other units: g/cm^3 , g/L

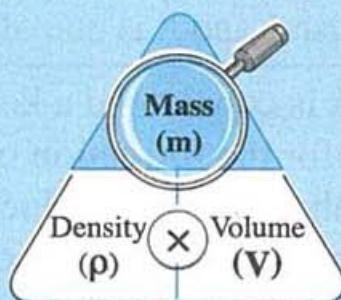
To convert between these units:

$$1 \text{ g/cm}^3 = 1000 \text{ kg/m}^3 = 1000 \text{ g/L}$$

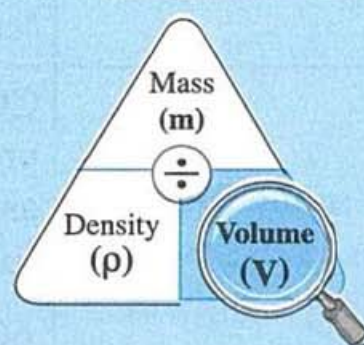
To calculate density



To calculate mass



To calculate volume



Example A tank contains a quantity of gasoline of mass 3450 kg and volume 5 m³, so **what** is the density of the gasoline?

Solution

$$m = 3450 \text{ kg}$$

$$V = 5 \text{ m}^3$$

$$\rho = ?$$

$$\rho = \frac{m}{V} = \frac{3450}{5} = 690 \text{ kg/m}^3$$

Relative density of a substance

=

Density of the substance at a certain temperature
Density of pure water at 4°C

2

The value of the relative density of a substance equals the value of its density in g/cm³.

Example

If the density of aluminum and the density of pure water at 4°C are 2700 kg/m³ and 10³ kg/m³ respectively, **calculate** the relative density of aluminum.

Solution

$$\rho_{\text{Al}} = 2700 \text{ kg/m}^3$$

$$\rho_{\text{w}} = 10^3 \text{ kg/m}^3$$

$$(\rho_{\text{Al}})_{\text{relative}} = ?$$

$$(\rho_{\text{Al}})_{\text{relative}} = \frac{\rho_{\text{Al}}}{\rho_{\text{w}}} = \frac{2700}{10^3} = 2.7$$

3

To convert between temperature on the Celsius scale (t_{C}) and the Kelvin scale (T_{K}), the opposite relation is used:

$$T_{\text{K}} = t_{\text{C}} + 273$$

Example

If you know that the normal human body temperature is 37°C , **what is** the equivalent temperature to it on the Kelvin scale?



Solution

$$\begin{aligned} T_K &= t_C + 273 \\ &= 37 + 273 = \mathbf{310\text{ K}} \end{aligned}$$

4 Calculating the amount of heat gained or lost by a body:

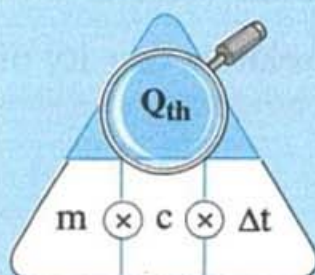
The amount of heat (Q_{th}) gained or lost by a body is determined using the opposite relation:

$$\begin{aligned} Q_{th} &= mc\Delta t \\ &= mc(t_2 - t_1) \end{aligned}$$

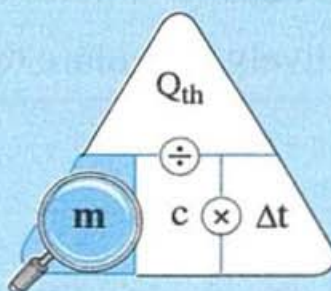
Where:

(m) is the mass of the body, (c) is the specific heat of the substance of the body, (Δt) is the change in temperature of the body, (t_1) is the initial temperature of the body, (t_2) is the final temperature of the body.

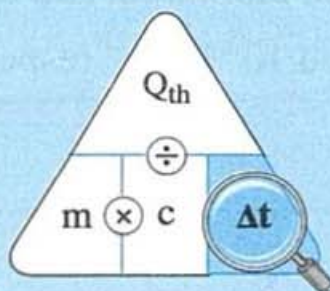
To calculate (Q_{th})



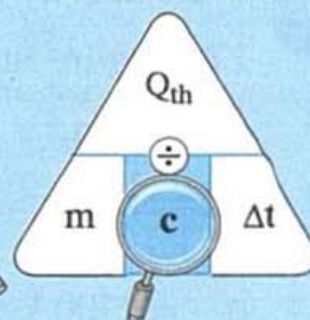
To calculate (m)



To calculate (Δt)



To calculate (c)



Example
1

Calculate the amount of heat required to raise the temperature of 0.3 kg of copper from 20°C to 70°C .

(Given that: the specific heat of copper = 390 J/kg.K)



Solution

$$m = 0.3\text{ kg}$$

$$t_1 = 20^{\circ}\text{C}$$

$$t_2 = 70^{\circ}\text{C}$$

$$c = 390\text{ J/kg.K}$$

$$Q_{th} = ?$$

$$\begin{aligned} Q_{th} &= mc\Delta t = mc(t_2 - t_1) \\ &= 0.3 \times 390 \times (70 - 20) = \mathbf{5850\text{ J}} \end{aligned}$$

Example 2

A piece of aluminum of mass 200 g having a temperature of 80°C is dropped into a quantity of water at room temperature, so the final temperature of the system becomes 40°C. Knowing that the specific heat of aluminum is 900 J/kg.K, and assuming no thermal energy leaked or lost out from the system, **calculate** the amount of heat gained by the quantity of water.

Solution

$$m_{\text{Al}} = 200 \text{ g} = 200 \times 10^{-3} \text{ kg}$$

$$t_1 = 80^\circ\text{C}$$

$$t_2 = 40^\circ\text{C}$$

$$c_{\text{Al}} = 900 \text{ J/kg.K}$$

$$Q_{\text{th}} = ?$$

Based on the law of conservation of energy, the amount of heat gained by the water is equal to the amount of heat lost from the aluminum piece.

$$\begin{aligned} Q_{\text{th}} &= m_{\text{Al}} c_{\text{Al}} \Delta t = m_{\text{Al}} c_{\text{Al}} (t_2 - t_1) \\ &= 200 \times 10^{-3} \times 900 \times (40 - 80) = -7200 \text{ J} \end{aligned}$$

The negative sign here indicates that the aluminum piece has lost heat to be gained by the water sample, so the amount of heat transferred to the water is **7200 J**.

Example 3

Two vessels (1), (2) contain different amounts of water, vessel (1) contains 300 g of water at a temperature of 90°C, and vessel (2) contains 60 g of water at a temperature of 15°C. If the two amounts of water from the two vessels are mixed together, **calculate** the final temperature of the mixture (t_o) neglecting the amounts of heat gained or lost by the vessels.

Solution

$$m_1 = 300 \text{ g}$$

$$\Delta t_1 = t_o - 90$$

$$m_2 = 60 \text{ g}$$

$$\Delta t_2 = t_o - 15$$

$$t_o = ?$$

∴ The total heat lost = - the total heat gained

$$\therefore m_1 c_1 \Delta t_1 = -m_2 c_2 \Delta t_2$$

∴ Both of the two vessels contain the same liquid (water) and the specific heat is constant for the same substance.

$$\therefore m_1 \Delta t_1 = -m_2 \Delta t_2, \quad 300 \times (t_o - 90) = -60 \times (t_o - 15)$$

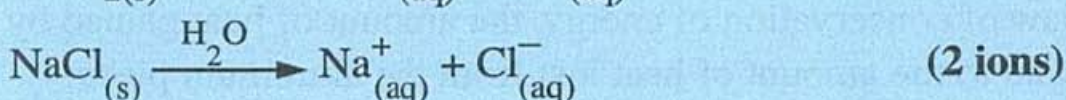
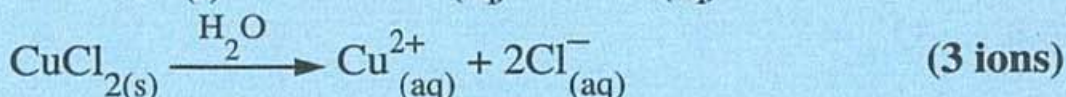
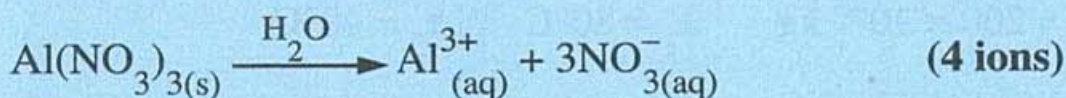
$$\therefore t_o = 77.5^\circ\text{C}$$

- 5 Assuming dissolving a known amount from each of NaCl , CuCl_2 and $\text{Al}(\text{NO}_3)_3$ in equal amounts of water at the same temperature.

Arrange the formed solutions ascendingly according to:

- (1) Vapor pressure. (2) Boiling point.
(3) Freezing point. (4) Osmotic pressure.

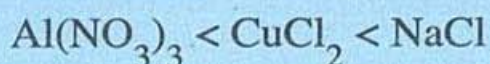
The number of the resulted ions from the dissolution of each molecule in water is calculated as follows:



Solution

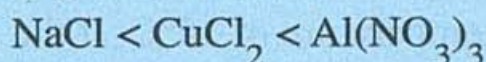
(1) Vapor pressure:

The vapor pressure decreases by increasing the number of solute ions or molecules. So, the arrangement will be:



(2) Boiling point:

The boiling point increases by increasing the number of solute ions or molecules. So, the arrangement will be:



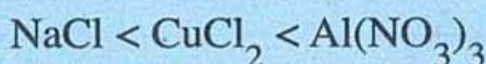
(3) Freezing point:

The freezing point decreases by increasing the number of solute ions or molecules. So, the arrangement will be:



(4) Osmotic pressure:

The osmotic pressure increases by increasing the number of solute ions or molecules. So, the arrangement will be:



6 Measuring the solubility of gas in the solution:

Solubility

=

$\frac{\text{The mass of dissolved gas}}{\text{The volume of solution}}$

Example

Calculate the solubility of O_2 gas in water at a temperature of $23^\circ C$, when 16 mg of O_2 has been dissolved and the solution has been completed till 2 L



Solution

$$\text{Solubility} = \frac{\text{The mass of dissolved gas}}{\text{The volume of solution}} = \frac{16}{2} = 8 \text{ mg/L}$$

7 Calculating the liquid pressure (P) at a point inside it:

* The pressure of a liquid can be calculated by knowing the pressing force (F) resulted from the liquid pressure and affecting a surface of area (A) at that point from the relation:

$$P = \frac{F_g}{A}$$

* SI measuring unit of force (F) is Newton (N).

Example

A cuboid fish tank of base area 1000 cm^2 is placed on a horizontal surface and contains water of weight 4000 N, **what is** the water pressure on the bottom of the tank?



Solution

$$A = 1000 \text{ cm}^2 = 1000 \times 10^{-4} \text{ m}^2$$

$$F_g = 4000 \text{ N}$$

$$P = ?$$

$$P = \frac{F_g}{A} = \frac{4000}{1000 \times 10^{-4}} = 4 \times 10^4 \text{ N/m}^2$$

7 What are the factors

1 On which the density of a pure substance depends?

- (1) The mass of molecules.
- (2) The spaces between molecules.

2 That affect the density of water in the oceans?

- (1) Water pressure "has an effect at great depths".
 - (2) Water temperature.
 - (3) Water salinity.
-

3 On which the amount of heat gained or lost by a body depends?

- (1) Mass of the body (m).
 - (2) Specific heat of the body substance (c).
 - (3) The change required in the body temperature (Δt).
-

4 On which the specific heat of a substance depends?

- (1) The type of substance.
 - (2) The physical state of the substance.
 - (3) The degree of purity of the substance.
-

5 That affect the enzyme's activity?

- (1) Temperature.
 - (2) pH of the reaction medium.
-

6 That affect aquatic environments and the living organisms in them?

- (1) The effect of atmospheric air gases dissolving in water.
 - (2) The penetration of light and solar radiation through water.
 - (3) The effect of pressure inside water.
-

7 That affect the solubility rate of oxygen and carbon dioxide gases in water?

- (1) Temperature.
- (2) Pressure.
- (3) The nature of materials.

8 Tables and comparisons

1	Water (H ₂ O)	Hydrogen sulphide (H ₂ S)
Chemical structure		
Type of bonds between the atoms in the molecule	Covalent	Covalent
Hydrogen bonds between molecules	Present	Absent
Boiling point (under normal atmospheric pressure)	High (100°C)	Low (− 61°C)
Molecule polarity	Higher than H ₂ S	Lower than H ₂ O
Molecular mass	Less than H ₂ S	Greater than H ₂ O

2	Basic solution	Neutral solution	Acidic solution
The relation between the concentration of H ⁺ and OH [−]	H ⁺ < OH [−]	H ⁺ = OH [−]	H ⁺ > OH [−]
The pH value of the solution	Greater than 7	Equals 7	Less than 7
Example	The solution resulted from the dissolution of sodium bicarbonate (NaHCO₃) salt in water $\text{NaHCO}_{3(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{Na}^+_{(aq)} + \text{OH}^-_{(aq)} + \text{H}_2\text{CO}_{3(aq)}$	The solution resulted from the dissolution of ammonium bicarbonate (NH₄HCO₃) salt in water $\text{NH}_4\text{HCO}_{3(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2\text{CO}_{3(aq)} + \text{NH}_4\text{OH}_{(aq)}$	The solution resulted from the dissolution of ammonium chloride (NH₄Cl) salt in water $\text{NH}_4\text{Cl}_{(s)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{NH}_4\text{OH}_{(aq)} + \text{H}^+_{(aq)} + \text{Cl}^-_{(aq)}$

3	The pH meter	The pH test paper tapes (strips)
Observation during using or measurement	On immersing the electrode of the device in the solution, digital reading is appeared.	On immersing the strip in the solution, it has been colored by a certain color.
Determination of the pH value	The value ranges from 0 to 14, on which pH value is determined.	The color is compared with the attached standard chart with strips to determine the pH value.

4	Warm-blooded organisms	Cold-blooded organisms
Method of regulating body temperature	Organisms that can maintain a constant internal body temperature through metabolic processes, regardless the temperature of the surrounding environment.	Organisms that rely on external sources (like the sunlight or warm environments) to regulate their body temperature, which changes with the temperature of the surrounding environment.
Examples	* Birds. * Mammals.	* Most vertebrates like fish, amphibians and reptiles. * All invertebrates like arthropods and mollusks.

5	Pure water	Aqueous solution
Forces that affect the properties	Attraction forces among water molecules that are produced from hydrogen bonds (weak).	* Attraction forces between water molecules that is produced from hydrogen bonds (weak). * Attraction forces among water molecules and solute molecules or ions (strong).
The value of vapor pressure	Higher	Lower
Boiling point	Lower	Higher
Freezing point	Higher	Lower
Osmotic pressure	Vanished (due to the absence of solutes).	Has a value that increases by increasing the number of solute molecules or ions.

6	Prokaryotes	Eukaryotes
Number of cells forming the living organism	Unicellular	Unicellular or multicellular
Site of genetic material	In the cytoplasm, not surrounded by a nuclear membrane.	Inside the nucleus and surrounded by a nuclear membrane.
Examples	Bacteria	* Eukaryotes are classified into four kingdoms: - Kingdom Protista, like golden algae. - Kingdom Fungi, like yeast. - Kingdom Plantae. - Kingdom Animalia, like sponges.

7	Kingdom Protista	Kingdom Fungi	Kingdom Plantae	Kingdom Animalia
Number of cells forming the living organism	Most of them are unicellular and some of them are simple multicellular organisms.	Most of them are multicellular and some of them are unicellular as yeast.	Most of them are multicellular.	All of them are multicellular.
Mode of nutrition	* Can be: - Autotrophic as golden algae. - Heterotrophic as protozoa.	Heterotrophic	Autotrophic	Heterotrophic
Cell wall structure		Chitin substance.	Cellulose substance.	There is no cell wall.

8	Invertebrates	Vertebrates
	They have no backbone	They have backbone
	* They include: - Sponges, such as sponge. - Coelenterates, such as jellyfish. - Worms. - Arthropods, such as insects. - Mollusks, such as clams. - Echinoderms, such as starfish.	* They include: - Fish. - Amphibians. - Reptiles. - Birds. - Mammals, including human at the top.

9	Cell wall	Plasma membrane (Cell membrane)
Description	A thick wall surrounds the cell from outside.	A thin semi-permeable membrane surrounds the cell and separates between its components and its surrounding environment.
Location	Plant cells, fungi and bacteria.	In all living cells.

10	Vacuoles in plant cell		Vacuoles in animal cell	
Size	Large		Small	
Number	One, located at the center of the cell and called "sap vacuole".		Numerous	

11	Catabolism		Anabolism	
Definition	A process of breaking the chemical bonds among the atoms of complex molecules to release the energy that is stored in them.		A process of building large and complex molecules from simple molecules with consuming energy.	
Examples	The breakdown of glucose during cellular respiration process into CO_2 and water.		* Synthesis of proteins from amino acids. * Photosynthesis process.	

12	Example	Structural suitability or existed structures	Purpose
Structural (Anatomical) adaptations	① Bony fish in general (for example: tilapia fish)	Streamlined body.	Reducing the water resistance to the fish movement.
		Scales and mucus.	To be water-resistant and reduce the water resistance to the fish movement.
		Fins	Organs of locomotion in water.
		Air (Swim) bladder.	For floating in water.
		Gills	The extraction of dissolved oxygen in water.
	② Deep-sea fish (such as icefish)	Large eyes	To enable them to see in the dark.
		Compressed body.	Withstanding the high pressure of water.
	③ Dolphins (from mammals)	Streamlined body.	Reducing the water resistance to the fish movement.
		Fins instead of legs.	Helping them to swim.
		Breathing openings at the top of their heads instead of nose.	Allowing them to breathe the atmospheric air.

13	Example	Behavior	Purpose
Behavioral adaptations	① Salmon fish	Migration between fresh water and salt water.	Reproduction and survival.
	② Whales	Producing sounds.	Communication and hunting of preys.

14	Conditions	Example	Physiological suitability
Physiological adaptations	Lack of oxygen.	Some fish in deep oceans.	They reduce their oxygen needs by slowing down their metabolic rate.
	High water pressure.	Some fish at depths.	* They withstand high pressure through strong and durable arteries and veins. * They effectively adjust their blood pressure to be proportional to the high pressure exerted on them.
	Low osmotic pressure.	Unicellular organisms in fresh water.	They collect excess water from the cell in the contractile vacuole, which is pushed towards the cell membrane to discharge the water from it.
		Freshwater fish.	They get rid of excess water passing into the body through the kidneys in the form of diluted urine.
	High osmotic pressure.	Most saltwater fish.	They swallow large amounts of water and then get rid of excess salts through the kidneys and specialized cells in the gills.
		Sharks	They retain a high concentration of urea (a nitrogenous compound produced in the urine of many animals) to bring the osmotic pressure in their blood close to the osmotic pressure of the surrounding water.

15	Osmoregulation of freshwater fish	Osmoregulation of most saltwater fish
Osmotic pressure of fluids in the organisms' body	More than the osmotic pressure of fresh water.	Less than the osmotic pressure of salt water.
The organ which is responsible for adaptation	Two kidneys.	Kidneys and specialized cells in gills.
The form of excreted water	Diluted urine.	Concentrated urine.

16	Oxygen gas	Carbon dioxide gas
The sources in the aquatic environment	* The atmospheric air "the main source". * Phytoplankton, algae and aquatic plants through photosynthesis process.	* The atmospheric air. * Marine organisms through respiration process. * Human activities, such as industrial pollution and decomposition of organic matter carried by agricultural wastewater.
The effect of increasing the gas percentage in water	* Supporting respiration. * Improving metabolism. * Increasing the activity of swimming, hunting and reproduction. * Maintaining the balance of ecosystem through supporting diverse populations of plants, invertebrates and fish.	* It has several negative effects on the aquatic organisms, including: - The acidification which is harmful to egg and larval stages of some aquatic organisms. - Impairing respiration. - Weakening support structure: The increase of CO₂ in water leads to reducing calcification, which obstructs the ability of some organisms to build or maintain their skeletons and affects calcium balance in the bodies of fish, which weakens their growth.

17	External support in aquatic organisms	Internal support in aquatic organisms
Description	It is the external skeleton of living organisms.	It is the internal skeleton of living organisms.
Formation	* Chitin in some crustaceans, such as shrimps. * Calcium carbonate such as in oysters (from mollusks) and corals (from cnidarians).	* Bony skeleton: Consists primarily of calcium phosphate in addition to the collagen protein, such as in tilapia. * Cartilaginous skeleton: Such as in sharks and ray fish.

18 The photic zones in water		
The sunlit (surface) zone	The twilight (mid-depth) zone	The dark (deep) zone
A zone in which sufficient light is available for supporting photosynthesis.	A zone that receives a lower amount of light, which is insufficient for photosynthesis.	A zone where no light reaches, therefore it is completely dark.

19	Surface organisms	Intermediate-depth organisms	Deep-sea organisms
The depth where they live	Live near the water surface.	Live at intermediate depths from 200 m to 1000 m.	Live at depths greater than 2000 m.
Means of adaptation to depth	Having body structure that is less strong compared to organisms that live in the depths.	Use their swim (air) bladder to control their buoyancy and balance or to move between different depths during migration among seas and rivers.	* Have compact body structures. * Their bodies contain protein components and internal fluids. * Their bladders contain fluids instead of gases. * Having a large, oil-rich liver. * Having high levels of unsaturated fatty acids in their cell membranes structure.
Example	Sardine	Salmon	Ray fish

20	Bony fish (Osteichthyes)	Cartilaginous fish (Chondrichthyes)
The type of skeleton	Bony	Cartilaginous
Flexibility	Less flexible	More flexible
Suitability with environment	Strong bones help in supporting and keeping the stability of the body under different pressures, such as the water movement or water pressure.	Light, flexible cartilages that help in dealing with high pressures.
Examples	* Tilapia fish. * Mullet fish.	* Shark fish. * Ray fish.

1) From the properties of pure water:

- (1) It is a polar compound.
 - (2) It is a universal solvent for most substances, due to its ability to dissolve many ionic compounds, polar covalent compounds, and compounds with polar molecules.
 - (3) It is neutral (its pH value = 7).
 - (4) It forms acidic, basic or neutral solutions with salts, depending on the type of salt.
 - (5) It can exist in the three states of matter (solid – liquid – gas) within the known temperature range on the Earth's surface.
 - (6) Its atoms are bound by single covalent bonds, while its molecules are bound by hydrogen bonds.
 - (7) It boils at 100°C.
 - (8) Its density decreases when its temperature is lowered from 4°C to 0°C.
 - (9) It has a high specific heat.
 - (10) It has a high latent heat of vaporization.
-

2) The working principle of a hydrometer is based on the law of buoyancy since when the hydrometer is placed in a liquid, it is partially submerged according to the liquid's density **where in liquids with:**

- * **High density:** A smaller part of the hydrometer is submerged.
 - * **Low density:** A larger part of the hydrometer is submerged.
-

3) Ocean currents transport with the water from one region to another:

- * **Heat and salt** from the equatorial regions to the Earth's poles.
- * **Nutrients** from the ocean depths to the surface.

* **Fresh water** from rivers or molten glaciers to different places during their journey around the Earth.

4 The Kelvin scale is a scale for determining temperature in the International System of Units.

5 Celsius scale has negative values, since the zero Celsius is an arbitrary point, while Kelvin scale doesn't contain negative values, as the zero Kelvin represents the absolute zero temperature which is the temperature at which the kinetic energies of the system molecules cease (become zero).

6 When the temperature changes by one degree on the Celsius scale, it also changes by one unit on the Kelvin scale, i.e. **it is always:**

$$\Delta t (^{\circ}\text{C}) = \Delta t (\text{K})$$

7 When expressing the amount of heat transferred from or to a body, **its sign will be:**

* **Positive:** when it is gained by the body.

* **Negative:** when it is lost by the body.

8 Most living cells contain a nucleus having a genetic material, so they belong to the eukaryotes.

9 The kingdom Protista whose individuals are often aquatic.

10 The cells of living organisms are composed of organic molecules such as carbohydrates, proteins and lipids and inorganic molecules such as mineral salts and water.

11 **Action mechanism of enzyme:**

The action mechanism of enzymes is based on the lock-key theory, where the substrate shape fits exactly the enzyme through what is

known as "active site". The active site of the enzyme binds to the substance that is affected by, which is called the "substrate", helping to convert it into products with highly efficiency without any change occurring to the enzyme, so that it is ready to catalyze another reaction of the same type.

12 Properties of enzymes:

- (1) They participate in chemical reactions in the cell to increase their speed without being affected or changed.
 - (2) They are specific, so each enzyme is specific to one reactant called the "substrate".
 - (3) They reduce the activation energy required to start the reaction.
 - (4) They are affected in their action by the pH value and temperature.
-

13 Viperfish, which lives in the tropical regions of the major oceans, is one of the famous examples of structural and physiological adaptations of deep-ocean fish, **as it:**

- * Is characterized by the flexibility of its skeleton to withstand high pressure.
 - * Has high levels of hemoglobin in its blood to adapt with decreasing oxygen levels.
-

14 The decrease in the percentage of dissolved CO₂ gas in water on aquatic organisms, **leads to:**

- (1) Reducing the efficiency rate of photosynthesis and energy production.
- (3) Impacting food chains.
- (3) Disrupting water pH balance.

- 15 The amount of reflected energy from water surface depends on the angle at which sun rays hit the water surface, **so if the sun rays hit the water surface:**
- * **Perpendicularly:** a small part of sunlight gets reflected.
 - * **Inclined (at an angle):** a large part of sunlight gets reflected.
-
- 16 During the propagation of solar radiation in the sunlit (surface) zone, **we find that:**
- (1) Infrared rays are absorbed almost completely within 10 cm of depth from the surface.
 - (2) Visible light, **at a depth of:**
 - * **10 m:** more than 50% of its energy that was incident on the surface is absorbed.
 - * **100 m:** about 99% of its energy that was incident on the surface in clear equatorial waters is absorbed, letting only about 1%, mostly in the blue spectrum.
-
- 17 As light penetrates ocean water, longer wavelengths (warm colors like red and orange) are absorbed, while shorter wavelengths (cool colors like blue and violet) are scattered.
-
- 18 Tropical aquatic fish such as tuna and barracuda fish live in warm water, while cod fish prefers cold water that is present in regions further from the equator.
-
- 19 Gases are characterized by their ability to be compressed and to occupy any space, whereas liquids resist compression and thus maintain a nearly constant volume.
-
- 20 The pressure increases by about 1 atm per each 10 meters of depth beneath the water surface, while it is equal to the atmospheric pressure at the sea surface.

21) **The pressure at a point inside water increases with increasing:**

- (1) **The depth (h):** as the depth from the surface increases, the pressure increases due to the increased weight of the water column acting on a unit area at that point.
- (2) **Water density (ρ):** where the pressure at a certain depth in seawater is greater than the pressure at the same depth in lake water (fresh water, which has a low concentration of salts and low plankton population).

22) **The impact of human activities on the aquatic life:**

* **First: Negative activities that cause the ecological imbalance:**

- (1) **Pollution of water bodies with chemical substances:** such as pesticides and heavy metals that can affect water quality and harm the health of living organisms.
- (2) **Overfishing:** can lead to a decrease in the numbers of some species and affect the ecological balance.
- (3) **Habitat destruction:** destruction of natural habitats, such as coral reefs and wetlands, causes a loss of biodiversity.

* **Second: Positive activities that maintain the ecological balance:**

- (1) Preservation of natural resources.
- (2) Environmental awareness and education.
- (3) Sustainable development.
- (4) Adopting the eco-friendly practices.

10 **Reasons and explanations**

1) **The living organisms interact with each other and with the non-living components in the ecosystem.**

To adapt to the changeable conditions in the ecosystem.

2 Ocean water is not suitable for direct use.

Because of its high salt content.

3 Condensation has an important role in the water cycle in nature.

Because condensation contributes to the formation of clouds.

4 Stomata are important for the adaptation of plants to high atmospheric temperatures.

Because the plant gets rid of excess water in the form of vapor through the stomata during the process of transpiration, which lowers the temperature of the plant.

5 Water has an important role inside the living organism's cells.

As all the living organism's cells are surrounded by a membrane that allows the passage of water from the environment to inside the living cell carrying the required substances for producing energy and allows the passage of water from inside the cell to outside in order to get rid of wastes.

6 Water is a polar compound.

As the oxygen atom is characterized by being more electronegative than hydrogen atom. So, the electrons of the covalent bond are polarized (attracted) towards the oxygen atom forming a partial negative charge on the oxygen atom and a partial positive charge on the hydrogen atom.

7 * The elevation of the boiling point of pure water, although it is a covalent compound.

*** Water is liquid while hydrogen sulphide is gas, despite their similarity in structure.**

Due to the presence of hydrogen bonds among the water molecules, which causes its presence in the liquid state and having

high boiling point (while hydrogen bonds are absent among hydrogen sulphide molecules which causes its presence in the gaseous state).

8 The dissolution of sodium chloride in water is not considered hydrolysis.

Because the ions resulting from the dissociation of the salt do not react with water to form new acids or bases, but rather the salt ions remain in the solution without binding to the water ions.

9 * Pure water is neutral.

*** Water is at an ionic equilibrium.**

As some of its molecules dissociate to form hydrogen (H^+) ions, causing acidity, and hydroxide (OH^-) ions causing basicity in equal concentrations.

10 The solution that is produced from the dissolution of ammonium bicarbonate salt in water is neutral.

Because when ammonium bicarbonate (NH_4HCO_3) salt dissolves in water, hydrolysis occurs and the concentration of hydrogen (H^+) ions remains equal to the concentration of hydroxide (OH^-) ions, which makes the solution neutral.

11 The solution that is produced from the dissolution of sodium bicarbonate salt in water is alkaline.

Because when sodium bicarbonate (NaHCO_3) salt dissolves in water, hydrolysis occurs and this causes a decrease in the concentration of hydrogen (H^+) ions and an increase in the concentration of hydroxide (OH^-) ions, which makes the solution alkaline.

- 12 The solution that is produced from the dissolution of ammonium chloride salt in water is acidic.**

Because when ammonium chloride (NH_4Cl) salt dissolves in water, hydrolysis occurs and this causes an increase in the concentration of hydrogen (H^+) ions and a decrease in the concentration of hydroxide (OH^-) ions, which makes the solution acidic.

- 13 The density of a pure liquid substance does not change by changing the mass or the volume of a sample taken from it at a specific temperature.**

Because the density of a pure liquid substance is a characteristic physical property, so that the ratio between the mass of any sample of the substance and its volume is a constant value equal to its density.

- 14 Density has a unit of measurement, while relative density does not.**

Because density is calculated by dividing two different quantities (mass and volume), whereas relative density is a ratio of two similar quantities (e.g., density of a substance and density of water), so the units cancel out.

- 15 The presence of mercury in the bulb of a hydrometer.**

Because it helps the device balance vertically in liquids.

- 16 Lake water in polar regions begins to freeze at the surface rather than the bottom.**

* Because as surface water cools from 4°C to 0°C , it expands and becomes less dense than the water below it. This cold layer floats on top of the warmer denser water.

* As the temperature continues to decrease, this surface layer freezes, and the resulting ice floats, since it is even less dense than the water beneath it.

17) Fish can survive in frozen lakes and rivers.

Because the surface layer of ice acts as a thermal insulator for the water below, allowing it to remain liquid at approximately 4°C near the bottom.

18) When water from melting ice enters the ocean, it floats on the surface instead of sinking.

Because the density of melting ice (fresh water) is lower than that of ocean water (salt water).

19) Water has a high specific heat compared to other liquids.

This is due to the strong hydrogen bonds between its molecules, which require a large amount of energy to break.

20) Water is used as a cooling agent in car engines and factories.

Its high specific heat allows it to absorb a large amount of heat with only a relatively small increase in its own temperature.

21) Large water bodies help to moderate the temperature of surrounding areas.

Because in the summer:

- * **During the day:** The Sun heats the land faster than the water. As cool air from over the water moves towards the land to replace the rising hot air (creating a sea breeze).
- * **During the night:** The water slowly releases its stored heat into the atmosphere, which prevents temperatures from dropping sharply and helps maintain temperature stability.

22) Water has a high latent heat of vaporization.

This is due to the presence of hydrogen bonds between its molecules, that require a large amount of thermal energy to break.

23) The importance of water's high latent heat of vaporization for living organisms.

It helps living organisms regulate their body temperature, as

evaporating water molecules carry heat away from the body during the process of **sweating** or **transpiration**.

24 The vapor pressure of solution is always lower than the vapor pressure of the pure solvent forming it.

As the number of molecules exposed to evaporation from the surface of the solution is less, because some solute molecules or ions occupy a part of the liquid surface, as the energy required to overcome the strong attraction forces between water molecules and solute molecules or ions increases, therefore the number of evaporable molecules decreases and the vapor pressure of the solution decreases.

25 The boiling point of aqueous solution is higher than the boiling point of pure water at standard atmospheric pressure.

Due to the decrease in the vapor pressure of the solution compared to the vapor pressure of pure water. As the presence of attraction forces between the solute molecules or ions and the solvent (water), which leads to increasing the required energy to evaporate the liquid.

26 Spreading large amounts of salt on roads in cold countries at rainfall.

To prevent the freezing of rainwater on roads, prevent cars from skidding and reduce accidents.

27 The freezing point of an aqueous solution is always lower than the freezing point of pure water.

Because the attraction forces between water molecules and solute molecules or ions prevent the binding of water molecules with each other to form ice crystals.

28) Bacteria belong to prokaryotes.

Because they are living organisms whose cytoplasm contains genetic material that is not surrounded by a nuclear membrane.

29) Protozoa belong to eukaryotes.

Because they are living organisms whose cytoplasm contains genetic material surrounded by a nuclear membrane.

30) The cell wall of bacteria is characterized by containing peptidoglycan.

To give it the shape and rigidity.

31) * The nucleus determines the traits of the living organism.

*** The nucleus controls the activities of the living cell.**

Because the nucleus contains the genetic material.

32) The cytoplasm has an important role in the survival of the cell.

Because the cytoplasm contains some important chemical substances for the survival of the cell.

33) Chloroplasts have an important role in carrying out photosynthesis.

Because they contain chlorophyll substance.

34) Water acts as a universal solvent in the living cell.

Because it allows biochemical reactions to occur by dissolving mineral salts and nutrients, carrying gases like oxygen and carbon dioxide to facilitate their transport inside the living organism and getting rid of wastes from the living organism.

35) The internal temperature of living organisms is stable, despite the external fluctuations.

This is due to the high specific heat of water.

- 36) * **Water has a role in maintaining the internal balance of the body.**
* **Water has a role in supporting the complex chemical activities in the cell.**

Because water participates directly in the metabolic processes (metabolism), on which the life of living organisms depends.

- 37) **Enzymes are similar to chemical catalysts.**

Because they increase the speed of chemical reactions without being affected or changed.

- 38) **Enzymes are specialized proteins.**

Because for each enzyme, there is one reactant called the "substrate", so that the shape of the substrate matches the enzyme through what is called the "active site".

- 39) **Bony fish contain air bladder.**

Because the air bladder helps the bony fish to float in water.

- 40) **Salmon fish resort to migration to fresh water during their life cycle.**

To complete the process of reproduction.

- 41) **The suitability of the viperfish for living in the deep depths.**

Because the viperfish is characterized by the flexibility of its skeleton to withstand the high pressure in the depths, and it also has high levels of hemoglobin in its blood to adapt to the low oxygen levels in the depths.

- 42) **Deep-depths fish are characterized by having strong and durable arteries and veins.**

To withstand the high pressure exerted on them.

43 The contractile vacuole in *Amoeba* can be named as an osmoregulatory organ.

Because the contractile vacuole collects the excess water in the cell, then pushes it towards the cell membrane to discharge its water content outside the cell to maintain the osmoregularity of *Amoeba* with the surrounding medium.

44 Saltwater organisms' cells don't contain contractile vacuole.

Because most saltwater organisms swallow large amounts of seawater to compensate the water loss by osmosis, then they get rid of the excess salts by the two kidneys and specialized cells in gills.

45 The osmotic adaptation process of freshwater fish is different from that in most saltwater fish.

Because in freshwater fish, large amounts of water pass into their bodies and get rid of excess water by kidneys to protect their bodies from bursting. While most saltwater fish swallow large amounts of seawater to compensate the water loss by osmosis, then get rid of excess salts by the two kidneys and specialized cells in gills.

46 Urea plays an important role in keeping sharks alive in their environment.

Because sharks retain a high concentration of urea in their blood, where the high concentration of urea increases the osmotic pressure of the blood to become close to the osmotic pressure of the surrounding water, thus reducing water loss from the bodies of sharks to the surrounding environment.

47 Gills play a mutual role as an excretory organ and a respiratory organ in most marine fish.

Because they have specialized cells to get rid of excess salts. Also, they act as a respiratory organ, since they extract the dissolved oxygen in water and get rid of the carbon dioxide produced from respiration process.

- 48 Under normal conditions, the ratio between the concentrations of CO_2 and O_2 gases in water differs from that between their concentrations in air.**

Because the concentration of oxygen in air is about 500 times higher than the concentration of carbon dioxide gas, but the solubility of oxygen gas in water is 50 times less than that of carbon dioxide gas.

- 49 The percentage of dissolved oxygen in Red Sea water is higher than its percentage in Gulf of Suez water.**

As the increase in the intensity of waves in Red Sea compared to Gulf of Suez causes an increase in the rate of gases exchange between the atmospheric air and water, therefore the solubility of oxygen gas increases.

- 50 The concentration of CO_2 and O_2 gases in the Mediterranean Sea water is lower than that in the Nile River water.**

Because the solubility of both gases in salt water (Mediterranean Sea) is about 20% - 30% less than their solubility in fresh water (Nile River).

- 51 High temperatures in marine environments may threaten the life of aquatic plants.**

Because the solubility of oxygen gas necessary for respiration process and the solubility of carbon dioxide gas necessary for photosynthesis process decrease at higher temperatures.

- 52 The rate of photosynthesis process for an aquatic plant at 20°C differs from its rate at 50°C .**

Because the solubility of carbon dioxide gas in water, which is necessary for photosynthesis process, is lower at higher temperatures, therefore the photosynthesis rate decreases with increasing temperatures.

- 53 The high percentage of carbon dioxide gas in the atmosphere affects the pH value of water.**

Because the high levels of CO_2 gas in the atmosphere cause the

dissolution of CO_2 gas in water at a higher concentration, which leads to an increase in the concentration of carbonic acid (H_2CO_3) and therefore a decrease in the pH value of the water.

54 The change in the pH value of water threatens the life of some living organisms.

As the decrease in the pH value of water means the occurrence of acidification process, which is harmful to many species of aquatic organisms, especially those in sensitive life stages such as egg and larval stages, in addition the increase in the pH value of water (increase the alkalinity of water) negatively affects the sensitive species that adapt to certain pH range.

55 The higher the percentage of carbon dioxide gas in water, the more negatively the respiration process of marine organisms is affected.

Since the high levels of carbon dioxide in water may lead to a decrease in the percentage of dissolved oxygen, which obstructs the respiration of aquatic organisms.

56 The high percentage of carbon dioxide gas in water harms some marine organisms as oysters and corals.

Because these organisms depend on calcium carbonate to form their shells or skeletons, which is a solid substance that is slightly soluble in water and the increase in carbon dioxide percentage leads to its conversion into calcium bicarbonate (which is soluble in water) and thus the process of calcification decreases, which obstructs the ability of these organisms to build or maintain their skeletons.

57 Food chains may be negatively affected by the decrease in the percentage of carbon dioxide gas dissolved in water.

As the decrease in the level of dissolved carbon dioxide gas in water can lead to a decrease in the rate of sugar formation such as glucose, which limits the energy reserves in producer organisms such as

phytoplankton and algae and thus the amount of energy available to living organisms in the higher levels of the food chains decreases.

58 Photosynthesis is not completed in the twilight zone (mid-depth zone) of the ocean.

Because the amount of light reaching this twilight zone is insufficient for the photosynthesis process to occur.

59 Solar radiation plays a vital role in maintaining ecological balance in aquatic environments.

Because solar radiation affects ecological balance in aquatic environments through its direct influence on:

- * The process of **photosynthesis**, which is the foundation of marine life.
- * **Water temperature**, which in turn affects the distribution of marine organisms.

60 Algae and phytoplankton are abundant in the surface layers of the water.

Because sufficient light is available in the surface layers of water for photosynthesis to produce food.

61 Coral reefs flourish in shallow waters near the equator.

Because solar radiation is available throughout the year which stimulates the growth of symbiotic algae that live within the coral tissues and provide them with food, allowing them to thrive.

62 The decrease in solar radiation in polar regions during winter affects aquatic food chains.

Because it leads to a significant reduction in photosynthesis rates, which impacts the availability of food for marine organisms.

63 Water pressure at a point inside it increases with the depth of the point beneath the surface.

Due to the increase of the weight of the water column above that point.

64 The body structure of organisms living near the surface is less strong compared to deep-sea organisms.

Because the organisms that live near the surface are exposed to relatively low water pressure.

65 Ray fish does not have a swim bladder.

To ensure that it does not collapse under the high pressure of the water in the deep.

66 Ray fish has a large liver filled with oils.

To help it float and control its depth.

67 Organisms in the deep-depths have compact body structures and their bodies contain protein components and internal fluids.

To make the structure of their bodies suitable for the enormous pressure they are exposed to.

68 There must be a balance in the levels of nitrate and phosphate salts in the aquatic environment for algae.

Because if the amounts of nutrients necessary for the growth of algae (such as nitrogen and phosphorus) increase excessively, this leads to an abnormal algal blooming, which leads to an ecological imbalance.

69 Predatory fish have an important role in preserving coral reefs.

Because predatory fish maintain the balance of coral reefs by controlling the numbers of small organisms such as sea urchins, which can destroy the reefs if their numbers increase abnormally.

70 Overfishing of tuna (predatory) fish can affect the producers in the ecosystem.

Because the decrease in the numbers of tuna as a result of overfishing can lead to an increase in the numbers of preys that affect the growth of producers, which disrupts the ecological balance in the system.

71 Using bicycles and public transportation are eco-friendly practices.

As using bicycles and public transportation reduces carbon emissions compared to using individual means of transportation that run on fossil fuels.

72 Promoting sustainable development has a great importance to the Egyptian agricultural environment.

Because it helps to preserve the needs of the current generation of agricultural crops without compromising the ability of future generations to meet their food needs.

73 Increased competition between individuals of different species has a negative impact on the ecological balance.

Because competition between individuals of different species leads to the distribution of available resources over a larger number of species, so the share of each individual of food and energy decreases, which can lead to a decrease in the numbers of some species of living organisms, which affects the ecological balance.

11 What happens when?

1 The infiltration of water through the pores of soil and sedimentary rocks.

Groundwater will be formed.

2 A plant performs transpiration, "concerning the transport process in the plant".

The rate of transport in the plant increases due to the increased ascent of water and salts from the root to the upper parts of the plant through the xylem tissue.

3 The polarity of a water molecule.

- * Attaching its molecules together or with polar covalent molecules of other substances by hydrogen bonds.
 - * Dissolving many ionic compounds, polar covalent compounds and compounds with polar molecules.
 - * Dissolving many salts and dissociating them into hydrated ions.
-

4 Adding sodium chloride crystals to water.

Sodium chloride molecules dissociate into (Na^+) and (Cl^-) ions and water molecules surround the ions, where the negative (Cl^-) ion of the salt is surrounded by the positive hydrogen atoms of water, and the positive (Na^+) ion of the salt is surrounded by the negative oxygen atoms of water.

5 Dissolving ammonium bicarbonate salt in water, "regarding the concentration of H^+ and OH^- ions".

The concentration of hydrogen ions H^+ remains equal to the concentration of hydroxide ions OH^- .

6 Dissolving sodium bicarbonate salt in water, "regarding the pH value".

An alkaline solution will be formed and its pH value is greater than 7

7 Dissolving ammonium chloride salt in water, "regarding the pH value".

An acidic solution will be formed and its pH value is less than 7

8) The temperature of a solid body increases, "concerning the density of its material".

The density of the body's material decreases.

9) The temperature of pure water increases from 4°C to 10°C , concerning its density.

The density of pure water decreases.

10) The temperature of pure water decreases until it reaches 4°C , concerning its density.

The density of pure water increases.

11) The temperature of pure water decreases from 4°C to 0°C , concerning its density.

The density of pure water decreases.

12) Fresh water resulting from the melting of ice enters the ocean.

The fresh water spreads over the surface of the ocean because it is less dense.

13) Fresh water resulting from the melting of ice freezes as it flows into the ocean.

It forms a thermal insulator between the deep regions of the ocean and the cold atmosphere.

14) A hydrometer is placed in a high-density liquid after it was placed in a lower-density liquid.

A larger part of the hydrometer floats in the case of the higher-density liquid.

15) The rate of evaporation equals the rate of condensation.

A dynamic equilibrium occurs between the liquid and its vapor.

- 16 The vapor pressure of a pure liquid equals the atmospheric pressure exerted on its surface.**

The liquid starts to boil.

- 17 Increasing the number of non-volatile substance molecules that dissolved in the solution, "regarding the boiling and freezing points".**

The boiling point of the solution increases and its freezing point decreases.

- 18 The absence of chloroplasts from the cells of a bean plant.**

They will not be able to perform photosynthesis, which is necessary to produce food.

- 19 A living cell does not have a plasma membrane.**

The living cell will not be able to protect its internal components, nor it will be able to regulate the passage of substances into and out of the cell.

- 20 The specific heat of water inside cells decreases.**

Living organisms will not be able to maintain their internal body temperatures stable.

- 21 The absence of enzymes from living cells.**

The cell will need a high activation energy to start the chemical reactions in it, which are necessary for its survival, in addition to the slowdown or stopping of those reactions in the absence of enzymes.

- 22 * The temperature increases above the optimum temperature for the enzyme action.**

- * The pH value rises above the optimum value for the enzyme action.**

The activity of the enzyme will gradually decrease until it stops completely.

23) * Salmon are unable to migrate to fresh water.

*** The absence of behavioral adaptations in salmon.**

They will not be able to reproduce and spawn eggs.

24) The occurrence of acidification, "regarding the life stages of some aquatic organisms".

It harms many species of aquatic organisms, especially those in sensitive life stages such as egg and larval stages.

25) The numbers of phytoplankton, algae and plants from the aquatic environment decrease, "concerning the food chains".

A decrease in the rate of sugar formation and reducing energy production as a result of the decrease in the rate of photosynthesis, which produces glucose, and then the amount of energy available to living organisms in the higher levels of food chains decreases.

26) The temperature of aquatic environment increases to 40°C "regarding CO₂ and O₂ gases in water".

The solubility of CO₂ and O₂ gases in water decreases with increasing temperature and the percentage of dissolved carbon dioxide in water decreases by a greater rate than the decrease in the percentage of dissolved oxygen in water, which affects the life of aquatic organisms.

27) The percentage of dissolved CO₂ in water increases, "regarding the formation of skeleton of mollusks".

Calcium carbonate (slightly soluble in water) is converted into calcium bicarbonate (soluble in water), so the calcification process decreases, which obstructs the ability of these organisms to build or maintain their skeletons.

28 Insufficient light, "regarding coral reefs".

The symbiotic algae that live inside the coral tissues can't perform photosynthesis, so the coral reefs can't obtain their food which leads to their death.

29 Increasing the species of predators in an aquatic ecosystem, "concerning the number of preys".

It will cause a highly decrease in the number of preys.

30 Small fish which feed on zooplankton are consumed in large quantities by predatory fish.

It leads to an increase in the numbers of zooplankton, thus causing the imbalance of the aquatic ecosystem.

31 The amounts of nutrients such as nitrogen and phosphorus increase excessively in an aquatic environment.

It leads to the abnormal algal blooming and hence a disturbance in the aquatic ecosystem.

32 The destruction of natural habitats such as coral reefs and wetlands.

It causes the loss of biodiversity and disturbance in the aquatic ecosystem.

33 Heavy metals leak into one of the water bodies, "concerning the aquatic organisms".

It can lead to the death of many aquatic organisms and a disturbance of the ecological balance as a result of the pollution of the water body with heavy metals.

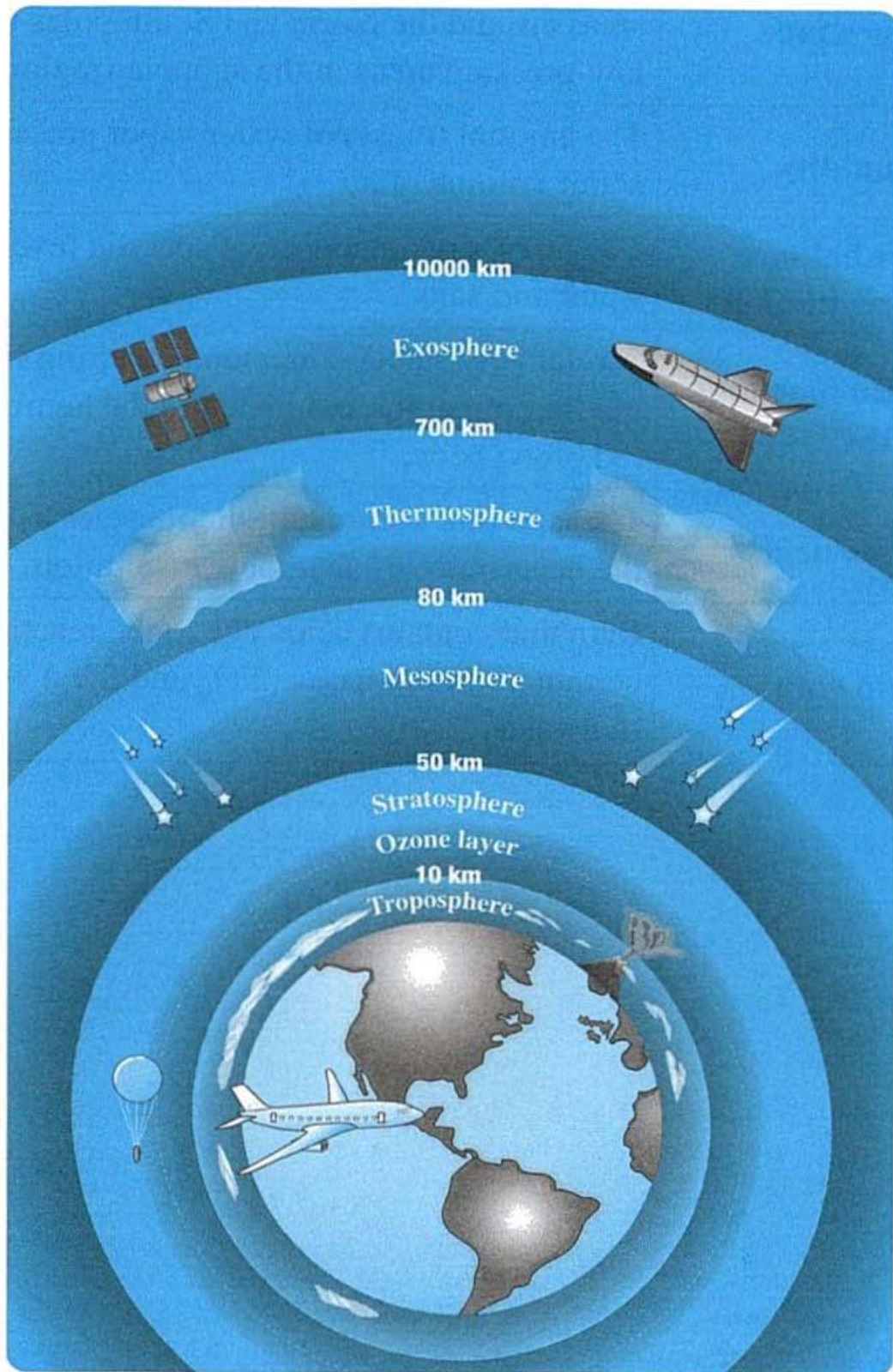
1 Scientific terms

Atmosphere	A layer of gases surrounding Earth and it is retained by the Earth's gravity.
Greenhouse gases	Gases that trap heat in the Earth's atmosphere and prevent it from leaking into space.
Greenhouse effect	It is the trapping of heat in the Earth's atmosphere, which causes the continuous increase in the temperature of the air near the Earth's surface due to rising concentration of greenhouse gases.
Aurora	A natural phenomenon observed at the poles, appearing as bright, colorful lights in the sky.
Escape velocity	The minimum speed with which gas molecules must move to escape from a planet's gravity.
Ozone layer	A layer in the atmosphere that acts as a shield, protecting the Earth from harmful ultraviolet radiation.
Ozone layer depletion	It is the gradual deterioration of the protective ozone layer in the atmosphere.
Smog	A phenomenon that is produced from the reaction of ozone gas with nitrogen dioxide and sulphur dioxide gases and fine particles in air.
Conduction	The method by which heat is transferred between two objects in contact or through a single solid object.
Convection	The method by which heat is transferred in fluids through the movement of parts of the fluid upwards and downwards.

Radiation	The method by which heat is transferred in the form of electromagnetic radiation.
Soaring (Thermal flight)	A technique used by birds where they use rising hot air currents by convection to float above these currents, allowing them to stay in the air for long periods without constantly flapping their wings for saving energy.
Isobars	Lines on weather maps that connect areas of equal atmospheric pressure.
Weather maps	Maps on which areas of high and low atmospheric pressure are visualized, with lines drawn to connect areas of equal atmospheric pressure.
Standard (Normal) atmospheric pressure	* The pressure resulting from the weight of an air column with a unit cross-sectional area, extending from sea level to the top of the atmosphere, at a temperature of zero degree Celsius. * The atmospheric pressure at sea level at zero degree Celsius, which is equivalent to the pressure of a mercury column of height 0.76 m.
Blood	A specialized connective tissue consisting of an intercellular substance called "plasma" in which blood cells are suspended.
Red blood cells	Cells in the blood tissue whose cytoplasm contains hemoglobin.
Hemoglobin "Red-colored pigment"	A substance found in the cytoplasm of red blood cells responsible for transporting oxygen and a little amount of carbon dioxide gas.
Plasma	The liquid component of blood.
Blood pressure	The force exerted by the blood during its circulation on a unit area of the walls of the blood vessels.

Wind	The horizontal movement of air from areas of high atmospheric pressure to areas of low atmospheric pressure.
Polar winds	Dry, cold winds that blow from high-pressure areas around the North and South poles to low-pressure areas in the subpolar regions.
Humidity	The amount (mass) of water vapor present in a unit volume of air.
Water balance "Osmoregulation"	The body's maintenance of specific levels of water and salts.
Carboxyhemoglobin (HbCO)	A relatively stable compound resulting from the binding of carbon monoxide to the hemoglobin of red blood cells.
Lactic acid	The acid that accumulates in muscles as a result of the occurrence of anaerobic respiration.
Acid rain	Rain that contains acids due to the reaction of certain polluting gases (NO_x and SO_x) with rainwater.

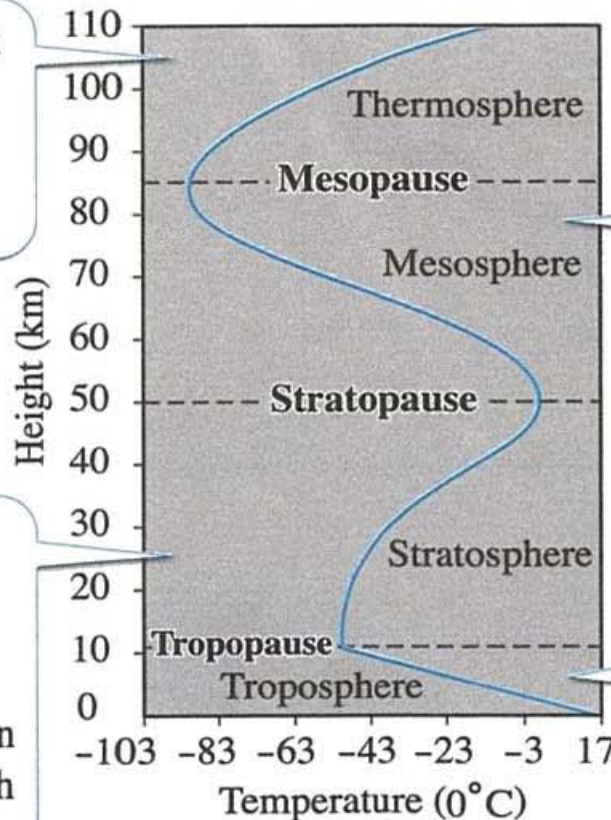
Layers of the atmosphere



2 Temperature in some layers of the atmosphere

This is the hottest layer, where temperatures can exceed 2000°C .

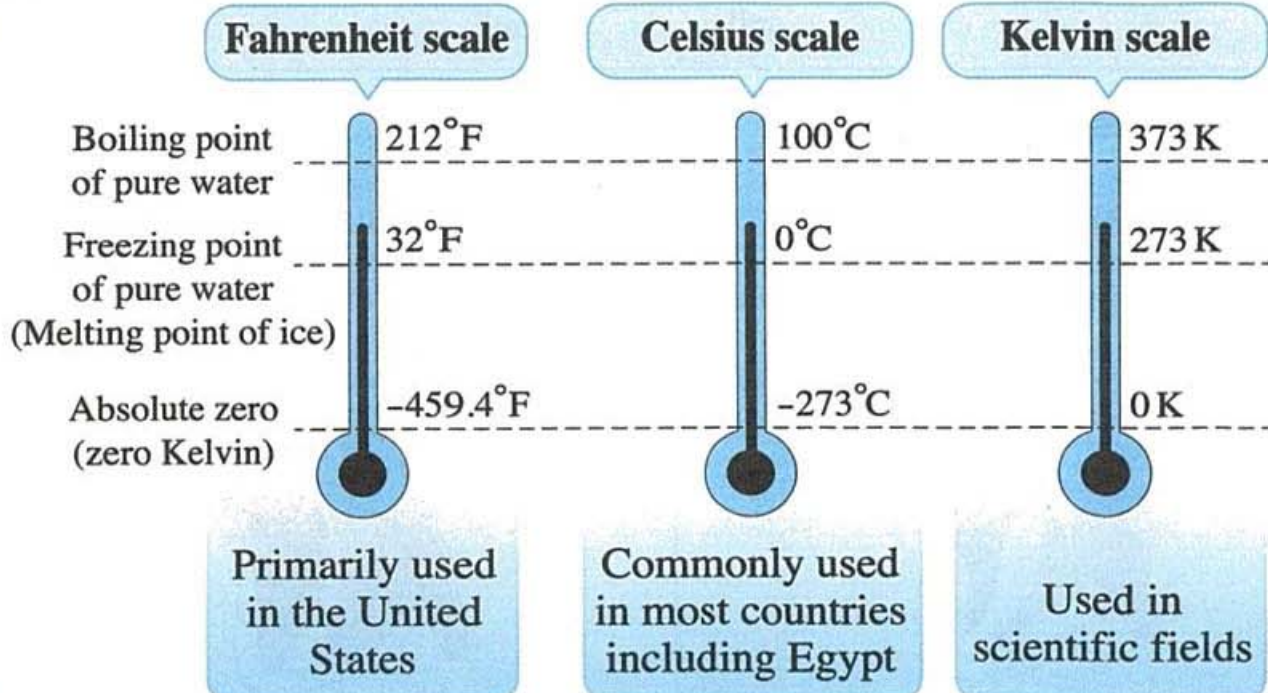
The temperature remains constant up to an altitude of 20 km above the Earth's surface, then it begins to rise with increasing altitude.



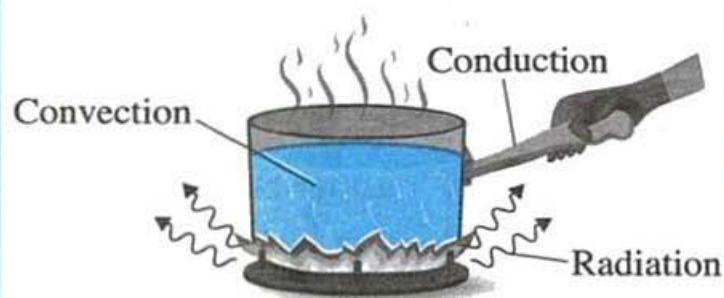
This is the coldest layer, where the temperature at its upper boundary reaches -93°C .

- The average temperature at the Earth's surface is approximately 15°C .
- The air temperature in this layer decreases as altitude increases, at a rate of 6.5°C for every 1000 m.

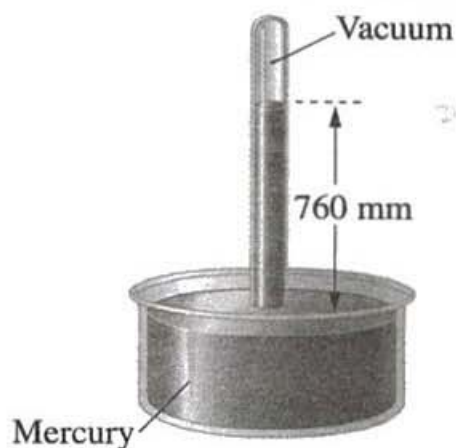
3 Measuring air temperature



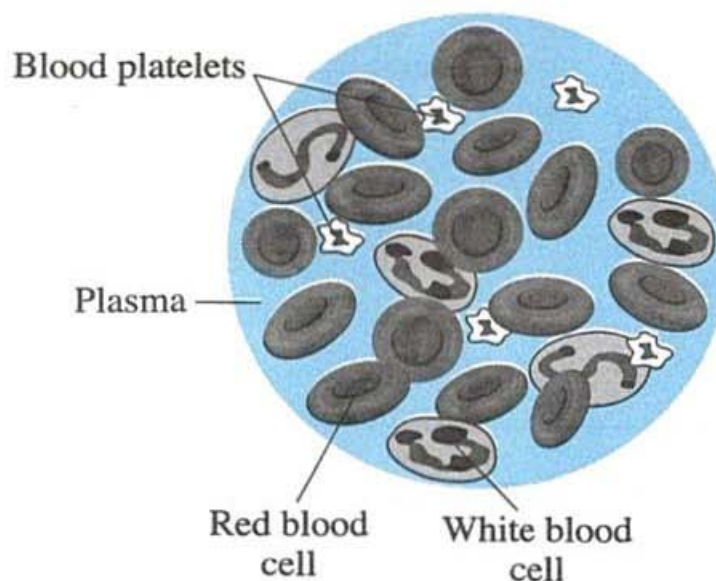
4 Mechanisms of heat transfer



5 The mercury barometer



6 Blood composition



7 Blood pressure in human

1 Systolic pressure

The resulted pressure from the heart (ventricular) contraction.

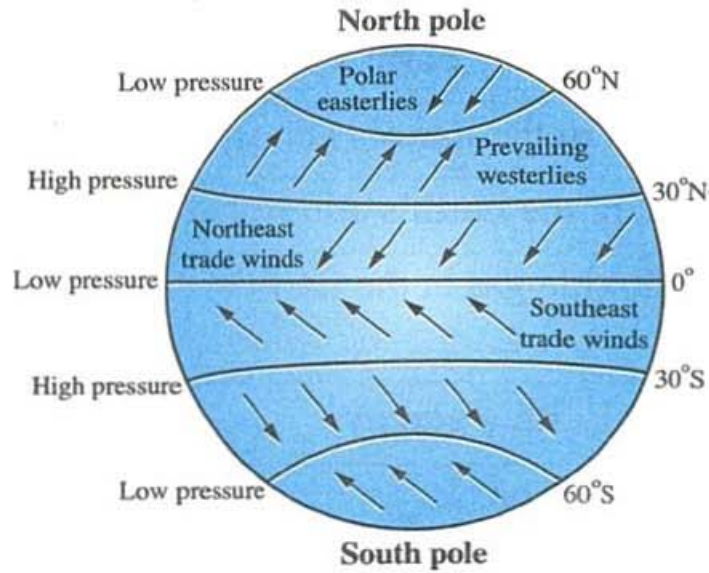


2 Diastolic pressure

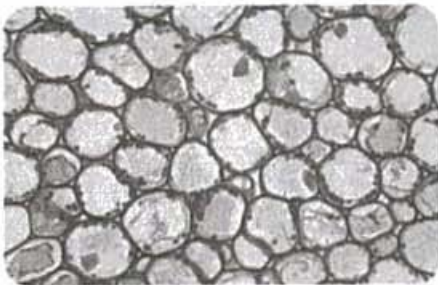
The resulted pressure from the heart (ventricular) relaxation.



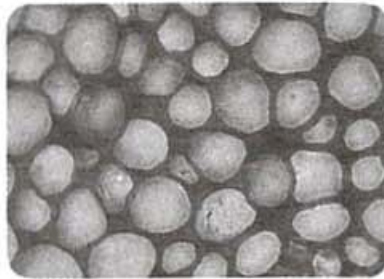
8 Global wind systems



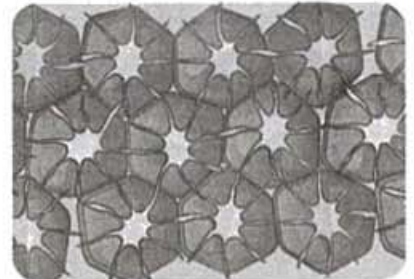
9 Tissues in the plant



Parenchyma tissue

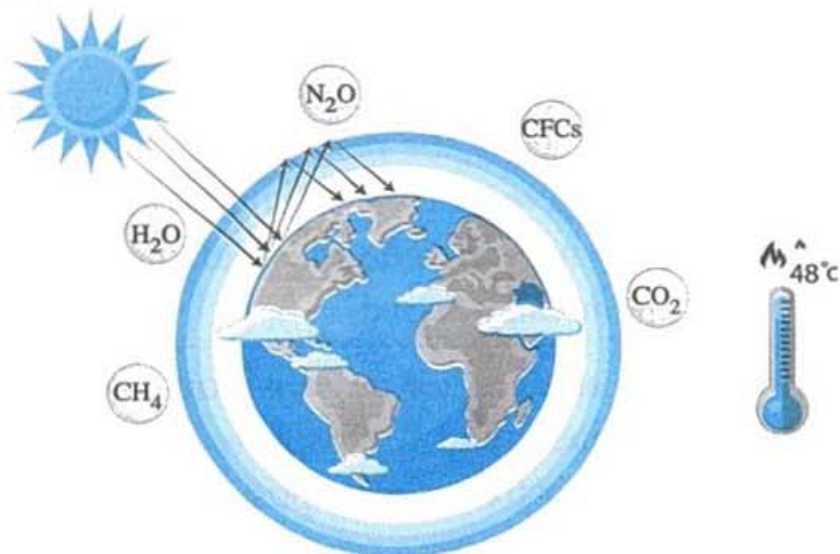


Collenchyma tissue



Sclerenchyma tissue

10 Global warming phenomenon



3

Numbers with scientific reference

The volume of nitrogen gas in the Earth's atmosphere.	About 78%
The volume of oxygen gas in the Earth's atmosphere.	About 21%
The volume of argon gas in the Earth's atmosphere.	About 0.93%
The volume of carbon dioxide gas in the Earth's atmosphere.	About 0.04%
Escape velocity (v_e) from Earth's gravity.	11.2 km/s
Near ultraviolet radiation (UVA).	315 nm - 400 nm
Medium ultraviolet radiation (UVB).	280 nm - 315 nm
Far ultraviolet radiation (UVC).	100 nm - 280 nm
Normal blood pressure for healthy adults.	120/80 mm Hg

4

Importance and uses

The Earth's atmosphere	* It acts as an insulating shield, protecting Earth from most harmful solar radiations and from incoming objects from space. * It retains part of solar radiation, helping to maintain moderate and life-sustaining temperatures. * It plays a fundamental role in the water cycle in nature, allowing fresh water to be distributed across the Earth's surface.
Oxygen gas	* Essential for the respiration of living organisms. * The active element in combustion processes and many natural and industrial chemical reactions (chemically active).
Tropopause layer	It acts as a barrier or transitional zone between the troposphere and stratosphere, preventing the mixing of cold air from the troposphere with warm air from the stratosphere.

Ozone layer in the stratosphere	It protects living organisms on Earth's surface from the harmful effects of short-wave ultraviolet radiation.
Ionosphere layer	* It is used in long-distance wireless communications due to its ability to reflect radio waves. * The aurora (polar lights) phenomenon occurs in it.
Ultraviolet rays	* They can be produced by special lamps to be used in: - Sterilizing surgical instruments and laboratory equipment to avoid microbial contamination. - Detecting counterfeit banknotes in stores.
The mercury barometer	Measuring atmospheric pressure.
Red blood cells	Their cytoplasm contains hemoglobin (red-colored pigment) that is responsible for transporting oxygen and a little amount of carbon dioxide gas.
White blood cells	They protect the body from bacteria, viruses, fungi and other foreign substances.
Blood platelets	They participate in blood clotting during bleeding.
Parenchyma tissue	* Performing photosynthesis process. * Storing nutrients and water. * Secreting the sap. * Helping in ventilation.
Collenchyma tissue	It provides some strength, flexibility and elasticity to the growing parts of the plant.
Sclerenchyma tissue	It provides a significant mechanical strength to the plant.
Hygrometer	Measuring the percentage of humidity in the air.
Water balance process	* It keeps blood pressure at a normal level. * It ensures the continuity of biochemical reactions inside cells. * It prevents dehydration, which can lead to dizziness or kidney failure in severe cases.

Gas scrubbers	They are installed in the chimneys of factories and power plants to remove sulphur and nitrogen oxides before they are emitted into the atmosphere.
Satellites and remote sensing	* Satellites perform multiple tasks to monitor the components of the atmosphere and their interactions, where: - Remote sensing devices aboard satellites measure the concentrations of gases responsible for the global warming phenomenon, such as carbon dioxide and methane. - They continuously monitor the state of the ozone layer, detect any depletion and track its recovery over time. - They provide us with data on cloud movement and wind patterns, helping meteorologists understand how weather and climate patterns are changing.
Meteorological monitoring stations	* Weather stations distributed around the world measure: - Temperature. - Atmospheric pressure. - Humidity percentage. - Wind speed. - Pollutant concentrations.

5 Laws and problems

Calculating the temperature at a certain altitude above the Earth's surface in the troposphere:

The temperature decreases by 6.5°C for every 1000 m of elevation.

Example

Choose: If the temperature at the foot of Mount Catherine is 20°C , then the temperature at an altitude of 800 m above the foot of the mountain equals

(a) 25.7°C

(b) -25.7°C

(c) 14.8°C

(d) -14.8°C

Solution

$$t_{\text{Foot}} = 20^{\circ}\text{C}$$

$$h = 800 \text{ m}$$

$$t_{\text{Mountain}} = ?$$

$\therefore$ The temperature decreases by 6.5°C as we climb up 1000 m of altitude.

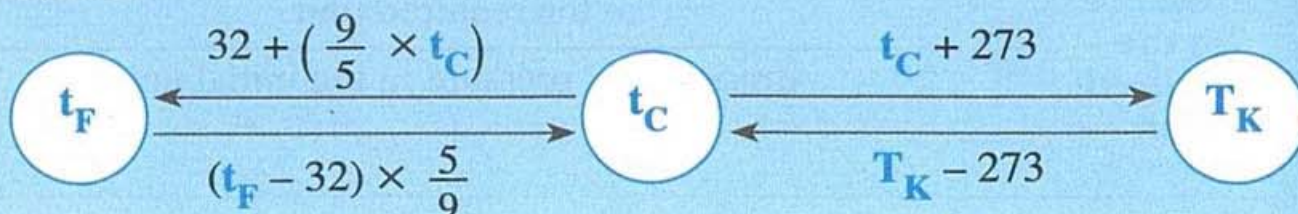
$$\therefore \Delta t = \frac{800}{1000} \times 6.5 = 5.2^{\circ}\text{C}$$

$$\therefore t_{\text{Mountain}} = t_{\text{Foot}} - \Delta t = 20 - 5.2 = 14.8^{\circ}\text{C}$$

$\therefore$ The correct choice is (c).

The conversion between different temperature scales:

It is possible to convert between the temperature on the Celsius scale (t_{C}) and the temperature on either Kelvin (T_{K}) or Fahrenheit (t_{F}) scales as follows:



Example

If the temperature of a sick person is 40°C , **what** is his temperature on each of the following?

- (1) Kelvin scale.
- (2) Fahrenheit scale.

**Solution**

$$t_{\text{C}} = 40^{\circ}\text{C}$$

$$T_{\text{K}} = ?$$

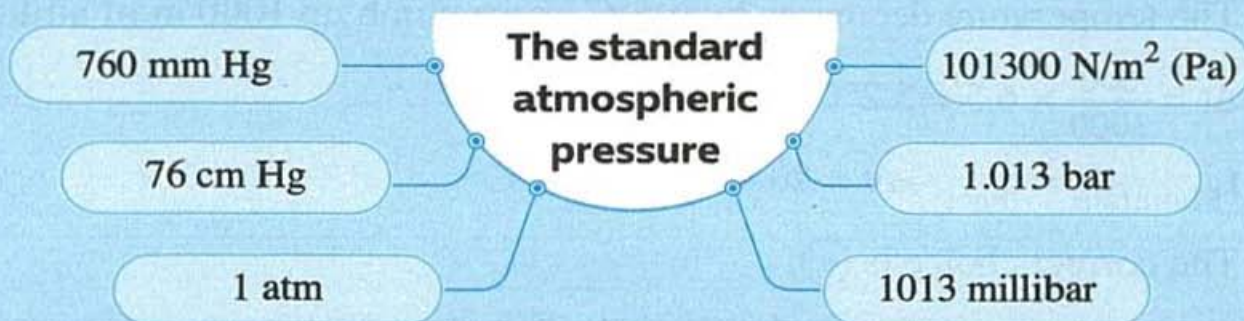
$$t_{\text{F}} = ?$$

$$(1) T_{\text{K}} = t_{\text{C}} + 273 = 40 + 273 = 313 \text{ K}$$

$$(2) t_{\text{F}} = \frac{9}{5} t_{\text{C}} + 32 = \left(\frac{9}{5} \times 40\right) + 32 = 104^{\circ}\text{F}$$

3

The standard atmospheric pressure can be expressed in several units:



It is possible to convert between the atmospheric pressure units using the following relation:

Pressure
in the
required
unit



The quantity to be converted $\times$ Atmospheric pressure
in the required unit

Atmospheric pressure in the initial unit

Example If you know that the atmospheric pressure in a location is equal to 950 millibar, **what** is the equivalent value to this pressure in the following units?

(1) Bar. (2) Pascal. (3) N/m^2 (4) mm Hg

(4) mm Hg

$$\text{Pressure in the required unit} = \frac{\text{The quantity to be converted} \times \text{Atmospheric pressure in the required unit}}{\text{Atmospheric pressure in the initial unit}}$$

(4) The atmospheric pressure in mm Hg = $\frac{950 \times 760}{1013}$
= **712.73 mm Hg**

(Where the effective velocity has a greater value for the molecules of less masses and higher temperatures)

(4) Humidity.

(2) Temperature: as the temperature rises, the rate of water evaporation increases and the air molecules move apart, increasing the amount of water vapor that a unit volume of air can carry, i.e. the humidity of air increases and vice versa.

1	Troposphere	Stratosphere	Mesosphere	Thermosphere	Exosphere
Order	The closest layer to the Earth's surface.	The layer above the troposphere (second layer).	The layer above the stratosphere (third layer).	The layer above the mesosphere (fourth layer).	The highest layer of the atmosphere.
Altitude from Earth's surface	Extends up to about 10 km.	Extends up to 50 km above Earth's surface (about 40 km thick).	Extends up to 80 km above Earth's surface (about 30 km thick).	Extends up to 700 km above Earth's surface.	Extends up to 10000 km above Earth's surface.
Importance	Most weather and climate phenomena occur in it (such as, cloud formation, rain, wind).	* Contains the ozone layer, which protects living organisms from harmful UV radiation. * Preferred layer for aircrafts flights due to horizontal air movement.	Most meteors burn up in this layer, which makes it play a vital role in protecting the Earth.	* It contains the ionosphere in its lower part that is used for long-distance radio communication. * The aurora phenomenon occurs in it.	The ideal region for satellites and spacecrafts, as they face almost no resistance, which allow them to orbit for long periods.

2 Conduction	Convection
* The transfer of heat inside solid materials or through direct contact. * Thermal energy is transferred from the molecules of higher temperatures to that of lower temperatures without the movement of the molecules themselves from their places.	* The transfer of heat in fluids (liquids and gases). * The higher-temperature parts of the fluid which have less density move upwards allowing the lower-temperature parts of the fluid (of higher density) to sink down and replace their positions, i.e., the thermal energy is transferred along with the movement upward of the fluid's parts.

3	Wood frog	Icefish	Thorny devil lizard
Habitat	Cold northern regions such as Alaska and Canada.	Frozen water in Antarctica.	Extremely hot environments such as deserts.
Adaptation method	★ When the temperature decreases in winter: The body partially freezes and enters in a deep hibernation, where: - Heart stops beating and it stops breathing but doesn't die. - It produces large amounts of glucose in its vital organs before freezing, which act as an antifreeze substance. ★ When the temperature rises in the spring: The ice melts and the heart starts to beat, then the vital functions begin to work again.	★ When the water temperature decreases: - It secretes special proteins in its blood "antifreeze proteins" which prevent the formation of ice crystals in the blood and tissues of the fish. - It absorbs oxygen directly from the water, where its blood doesn't contain hemoglobin that is essential for transporting oxygen in blood.	It has small channels on its skin surface that help it to collect the moisture from air or even from sand and direct towards its mouth, helping it to stay hydrated in a dry desert environment.

4	Parenchyma tissue	Collenchyma tissue	Sclerenchyma tissue
Description	* A living tissue whose cells are characterized by: - Thin cell walls composed mainly of cellulose. - Containing a large number of chloroplasts filled with starch. - Containing large vacuoles filled with water and minerals.	* A living tissue whose cells are characterized by: - Being longer than parenchyma cells. - Having irregularly thickened cell walls made of cellulose and pectin.	* A non-living (dead) tissue whose cells are characterized by: - Being rigid and impermeable to water due to their very thick cell walls made of cellulose and lignin. - Older cells are usually dead.
Location	Forms most of the soft tissues within various plant parts like leaves, stems and roots.	Usually found beneath the epidermis of leaf veins and stems, especially small stems.	

5 Effect of high or low humidity levels on human		
	At high humidity	At low humidity (dry conditions)
Sweat evaporation rate	Slower	Faster
Body's ability to cool itself	Decreases	Increases
Harmful effects	* Feeling hotter and more fatigued quickly. * Prolonged exposure to high humidity may cause: - Heat stress. - Heatstroke.	* Chapped lips. * Dry skin. * Dryness of mucous membranes in the nose and respiratory system, which increases the risk of respiratory infections. * Rapid water loss from the body, increasing the risk of dehydration.

6		
	Carbon monoxide (CO)	Sulphur dioxide (SO ₂)
Description	Colourless and odourless polluting gas.	A polluting gas contributes to the formation of acid rain.
Formation reason	It is usually produced by the incomplete combustion of fossil fuels (such as gasoline, coal and natural gas).	It is mainly emitted from: - The combustion of coal and oil in power plants and factories. - Certain industrial processes such as oil refining and metals smelting.

7	Sulphuric acid	Nitric acid
Formation	* Sulphur dioxide (SO_2) reacts with oxygen (O_2) to form sulphur trioxide (SO_3). * This reaction occurs in the presence of catalysts such as sunlight. $2\text{SO}_{2(g)} + \text{O}_{2(g)} \xrightarrow{\text{Sunlight}} 2\text{SO}_{3(g)}$ * Then, sulphur trioxide reacts with water droplets in clouds to form sulphuric acid (H_2SO_4), which is a very strong acid. $\text{SO}_{3(g)} + \text{H}_2\text{O}_{(l)} \longrightarrow \text{H}_2\text{SO}_{4(aq)}$	* Nitrogen oxides (NO_x) react with water to form nitric acid (HNO_3). * In the equation reaction, nitric acid and nitrous acid (HNO_2) are formed. $2\text{NO}_{2(g)} + \text{H}_2\text{O}_{(l)} \longrightarrow \text{HNO}_{2(aq)} + \text{HNO}_{3(aq)}$ * In general, the reaction can be summarized as follows: $4\text{NO}_{2(g)} + \text{O}_{2(g)} + 2\text{H}_2\text{O}_{(l)} \longrightarrow 4\text{HNO}_{3(aq)}$

	Harmful effect	Reason
On human health	* Irritation in the respiratory tract and increasing the probability of: - Asthma attacks. - Bronchitis. - Pneumonia.	Direct inhalation of SO_2 and NO_2 gases.
	Harms the lungs and reduces respiratory capacity	Formation of ground-level ozone (O_3) secondarily. $\text{NO}_x + \text{Volatile organic compounds} \xrightarrow{\text{Sunlight}} \text{Ground-level ozone}$
On plants	Direct damage to leaves.	* Entry of gases like SO_2 and NO_2 through stomata, which causes: - Deformation in the stomata. - Oxidation reactions in leaves. - Damage to leaf tissues.
	Reducing photosynthesis rate.	Damaged chlorophyll and clogged stomata, which decrease the absorption of CO_2 and consequently, the production of glucose.
	Nutrients depletion and loss of essential elements for plant growth.	Acid rain replaces essential salts like calcium and magnesium salts from the soil, reducing its fertility.
On buildings and infrastructure	Corrosion and damage of monuments and historical buildings.	The reaction of acids with limestone (CaCO_3). $\text{H}_2\text{SO}_{4(aq)} + \text{CaCO}_{3(s)} \xrightarrow{\text{(Sparingly soluble in water)}} \text{CaSO}_{4(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)}$ (Soluble in water)

Description	* Powerful computer programs are characterized by: - Simulating the Earth's climate system by inputting the current and future data, such as: gas emission levels. - Describing the movement and interactions of the atmosphere. - Relying on physical, chemical and biological equations.
Objectives	* Climate models enable the prediction of the long-term effects of human activities such as: - The effect of burning fossil fuels on carbon dioxide accumulation. - The effect of deforestation on the carbon cycle and gas balance.
Data sources	Satellites and weather monitoring stations, where the collected data by each of them are used to create complex climate models.
Applications	* Through climate models, scientists can predict some potential changes such as: - Rising temperatures: Scientists use climate models to predict that the continuous increase in carbon dioxide in the atmosphere leads to increasing the average temperature of the Earth by approximately ($1.5^{\circ}\text{C} - 2^{\circ}\text{C}$) over the coming decades. - Changing rainfall patterns. - Increasing the frequency of extreme weather conditions.

In public health	Forecasting the pollution levels or increased ultraviolet radiation helps in protecting human from respiratory system diseases or skin cancer.
In agriculture	Forecasting temperatures and rainfall enable farmers to choose appropriate planting and harvesting times.
In ecosystems	Predicting changes helps in protecting sensitive organisms and plan environmental conservation programs.

11

The effect of the weather monitoring stations forecasting a strong storm along the expected migration path of the bird flocks

Potential damage of the storm	Death of large numbers of birds and the risk of losing some species, as some birds rely on long intercontinental migration routes during migration seasons.
Actions taken based on forecasting	Wildlife protection centers issued environmental warnings, which helped in: * Rerouting some migration paths. * Reduce hunting during that period.
Result of the taken actions	Helped in protecting large numbers of birds from death, due to exhaustion or collision during the storm.

8 Remember that

- 1 The proportions of the atmospheric components are continuously changing due to various natural processes, **such as**:
 - (1) **Some biological processes that are carried out by living organisms, as in the process of:**
 - **Respiration:** Living organisms consume oxygen from the air and release carbon dioxide.
 - **Photosynthesis:** Plants absorb carbon dioxide from the air and release oxygen.
 - (2) **Geological phenomena:** Such as volcanic eruptions, which add large amounts of gases to the atmosphere.
- 2 Nitrogen gas is released into the atmosphere during the decomposition of dead plants and animals or as part of the gases released from volcanoes.
- 3 The existence of life in the troposphere is directly linked to its characteristics, **where**:
 - * It contains essential gases for life, such as oxygen, carbon dioxide, water vapor and some other gases.
 - * Its suitable temperature allows biological processes to occur.
 - * Its atmospheric pressure is suitable for most living organisms.

4 The interaction between suitable environmental conditions and the great diversity of living organisms makes the troposphere the most biologically active and essential for sustaining life on Earth.

5 The charged particles in the ionosphere result from the ionization of oxygen and nitrogen atoms, caused by high-frequency solar radiation like X-rays and gamma rays.

6 **The reason of occurrence of aurora phenomenon:**

- * When high-energy charged particles from the Sun (part of solar wind) reach Earth, the planet's magnetic field directs them toward the poles, so they collide with atoms and ions in the ionosphere, causing them to become excited.
 - * When these atoms return to their lower energy state, they release photons of various wavelengths, creating the bright lights we see in the sky.
-

7 The presence of satellites in the exosphere directly impacts our daily lives, **as they:**

- * Facilitate international communications and wireless internet.
 - * Form an essential part of the Global Positioning System (GPS).
 - * Provide accurate weather and climate data, which helps in predicting natural disasters.
 - * Monitor the Earth and outer space and enhance our understanding of the universe.
-

8 Ultraviolet rays are from electromagnetic spectrum types and they are invisible rays that propagate in space (vacuum) as electromagnetic waves and they have short wavelengths and high energy compared to visible spectrum.

9 * Ultraviolet rays (photons of electromagnetic spectrum) with wavelengths shorter than 240 nm are absorbed by nitrogen (N_2), oxygen (O_2) molecules and atomic oxygen (O) to form ozone gas.

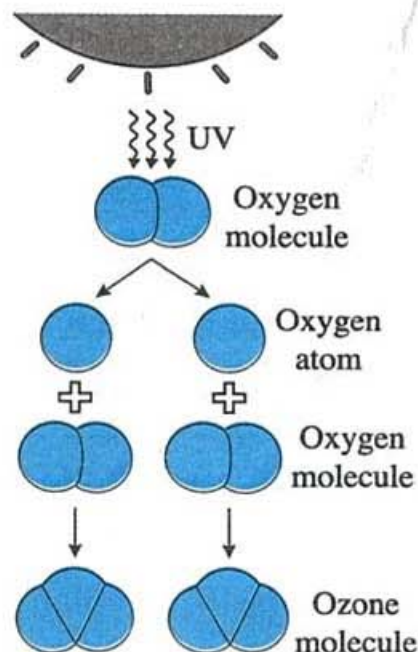
* Ultraviolet rays with wavelengths range from 240 nm : 310 nm are absorbed by ozone found in stratosphere.

10 The steps of the formation of ozone gas (O₃) in the stratosphere:

- (1) Oxygen molecule absorbs ultraviolet rays (UV) with a wavelength shorter than 240 nm, which causes the breakdown of the covalent bond in oxygen molecule (O₂), giving two free (individual) oxygen atoms (2O) which is known as photodissociation.



- (2) Each free (individual) oxygen atom (O) binds with another oxygen molecule (O₂) to form ozone molecule (O₃).



11 From the effects of ultraviolet rays on human health:

- (1) Increased exposure to ultraviolet (UV) rays leads to DNA damage in skin cells, which cause genetic mutations that may result in skin cancers, such as melanoma.
- (2) They affect certain immune cells, such as helper T-cells, which leads to a weakened immune response and makes the body more vulnerable to diseases and infections.
- (3) The absorption of ultraviolet (UV) rays by the eye's lens accelerates the occurrence of cataract, which leads to reducing the light transmittance of to the retina.

12 From the negative impacts of ground-level ozone (ozone in the troposphere):

- (1) The formation of smog.
- (2) It negatively affects the plants **which leads to:**
 - Burning of the plant leaves that reduces their ability to perform photosynthesis process.
 - The damage of plants and agricultural crops which affects their growth and productivity (quality).
- (3) Corrosion of some materials such as plastic and rubber.

13 The sun is the main source of heat and light on the Earth's surface.

So, when sun rays reach the Earth:

- (1) The temperature of the Earth's surface (land and water) rises more than that of the atmosphere.
- (2) Heat is transferred from the Earth's surface to the atmosphere.
- (3) The temperature of the atmosphere begins to rise, and the air layers closer to the Earth's surface become warmer than the layers farther away.

14 When the temperature changes by one degree on the Celsius scale, **it changes by an amount of:**

- * 1 unit on the Kelvin scale.
- * 1.8 degrees on the Fahrenheit scale.

15 In heat transfer by radiation, heat travels as electromagnetic radiation, which spreads in all directions and can propagate through space as well as through material mediums like gases.

16 The millibar (mbar) unit is used to express the atmospheric pressure on weather maps.

17 **A high percentage of humidity in the air affects:**

- (1) **Weather:** Increasing the probability of cloud formation and rainfall.
For example, in tropical regions with high humidity, heavy rains support the growth of dense forests.
- (2) **Animals:** Decreasing the rate of sweat evaporation, which reduces the efficiency of lowering body temperature.
- (3) **Plants:** Decreasing the rate of transpiration, which reduces the uptake of water and salts from the roots to the leaves.
- (4) **Human:** Slowing down the rate of sweat evaporation, which makes the body less able to cool itself, leading to:
 - Feeling hotter and more fatigued quickly.
 - Heat stress or heatstroke with prolonged exposure.

18 The suitable humidity level for humans is 40% to 60%. A significant deviation from this can harm cells and their ability to function properly.
For example, when humidity is low in air:

- (1) The body loses water faster by:
 - Sweating through skin.
 - Exhalation through lungs.
- (2) Special receptors in the brain sense this water deficiency.
- (3) The kidneys reabsorb water from the urine, making it more concentrated, due to the lack of water in it.

This helps the body maintain stable fluid levels even in dry conditions.

19 **From the strategies to reduce global warming:**

- (1) Using public transportation instead of vehicles to reduce car exhaust emissions.
- (2) Improving energy efficiency in houses and factories by using energy-effective technologies like LED lamps, high-efficiency electrical appliances and clean renewable energy sources, **such as:** solar, wind and hydropower.
- (3) Increasing green spaces (afforestation) by planting trees to help improving the air quality.

20 **Examples of greenhouse gases:**

- | | |
|---|---|
| (1) Carbon dioxide gas (CO_2). | (2) Methane gas (CH_4). |
| (3) Nitrous oxide gas (N_2O). | |
| (4) Chlorofluorocarbons compounds (CFCs). | (5) Water vapor (H_2O). |

21 **From the consequences of global warming phenomenon:**

- (1) Melting of polar ice caps that causes:
 - The flooding of coasts and the disappearance of some coastal cities.
 - The extinction of some polar species, due to the destruction of their natural habitats, which leads to decreasing biodiversity and disturbing the ecological balance.
- (2) Severe climate changes, such as hurricanes, floods and drought periods.

22 **Among the most important air pollutants are:**

- (1) Carbon monoxide (CO).
- (2) Sulphur oxides (Sulphur dioxide SO_2 – Sulphur trioxide SO_3).
- (3) Nitrogen oxides (Nitrogen monoxide NO – Nitrogen dioxide NO_2).

23 The reasons for the formation of nitrogen oxides (NO_x):

- * They can be formed naturally from lightning.
- * They are generated in large quantities during fuel combustion at high temperatures in:
 - Car engines.
 - Power stations.
 - Industrial furnaces.

24 The Impact of air pollution and acid rain on the sustainability of ecosystems and human:

- (1) Reducing the biological productivity (forests, water bodies and wild plants) which affects food and resources.
- (2) Loss of biodiversity due to the death of sensitive species or disruption of their functional role.
- (3) Decreasing air and water quality.
- (4) Imposing health and economic burden on communities (healthcare, building repairs and resource loss).

25 In 1985, the meteorological monitoring station in Antarctica, operated by the British meteorological office, revealed a large hole in the ozone layer.

Monitoring results:

It led to the launch of the Montreal Protocol in 1987, an international agreement that limited the use of ozone-depleting substances such as chlorofluorocarbons (CFCs). As a result, the ozone layer began to gradually recover, helping to protect humans and living organisms.

26 The effect of rising water temperature on coral reefs.

It leads to coral bleaching, where symbiotic algae are expelled from their tissues, causing the corals to lose their primary source of food and energy.

9 Reasons and explanations

- 1** * **The percentage of oxides of nitrogen gas in the air is very low.**
* **Oxygen and nitrogen gases coexist in the atmosphere without reacting under normal conditions.**

Because nitrogen gas is largely inert and does not react easily with other gases and elements under normal conditions and it needs special conditions such as lightning or extremely high temperatures to interact.

2 The importance of carbon dioxide gas for plants.

Because it is necessary for plants to carry out photosynthesis.

3 * Air temperature decreases with altitude in the troposphere.

*** The temperature at the summit of a mountain is lower than at its base.**

Because as altitude increases from the Earth's surface:

- The air expands due to lower atmospheric pressure and acquires the energy needed for this expansion from the kinetic energy of its molecules.
 - The average kinetic energy of the air molecules decreases, which in turn lowers the air temperature.
-

4 The troposphere is home to the most diverse forms of life on Earth.

The diversity of life in the troposphere is due to the availability of:

- * Essential gaseous components for life, such as oxygen, carbon dioxide, water vapor, and other gases.
 - * A suitable temperature that supports the occurrence of biological processes.
 - * An atmospheric pressure suitable for most living organisms.
-

5 The stratosphere is the preferred layer for aircraft flight.

Because the air movements within it are horizontal.

6 The temperature in the upper part of the stratosphere increases with altitude above 20 km from the Earth's surface.

Due to the presence of the ozone layer.

7 The mesosphere plays a vital role in protecting life on Earth.

Because most meteors that enter the atmosphere from space burn up and disintegrate as they pass through this layer.

8 The mesosphere is the coldest atmospheric layer.

Due to the low number of gas molecules capable of absorbing solar radiation.

9 The temperature in the thermosphere can rise above 2000°C.

Because oxygen and nitrogen gases in this layer absorb most of the high-energy (high-frequency) solar radiation, such as X-rays and gamma rays.

10 * The lower part of the thermosphere is called the ionosphere.

*** The ionosphere is electrically charged.**

Because solar radiation ionizes the atoms of oxygen and nitrogen in this layer.

11 * The ionosphere is used for long-distance wireless communications.

*** The ability of ionosphere to reflect short radio waves.**

Because its high concentration of charged particles, that reflect short radio waves back to Earth.

12 The planet Mercury has no atmosphere.

Due to its weak gravity.

13 Earth retains its atmosphere.

Because its relatively strong gravity so that the effective velocity of most gas molecules is less than the planet's escape velocity.

14 Avoiding the use of cleaning products that contain chlorine and bromine compounds.

To reduce ozone layer depletion.

15 Avoiding the use of fire extinguishers that contain halon gas.

Because halon gas contains bromine which is considered one of the most powerful ozone depleting substances.

16 * Ozone gas that is found in the stratosphere is considered a shield that protects Earth from the harmful radiations, but it is considered harmful for the ecosystem when it is found in the troposphere.

*** Ozone has positive and negative impacts.**

As its existence in the stratosphere protects the Earth from the harmful ultraviolet radiation that threatens the life of living organisms, while its existence in the troposphere has several negative effects, including:

- Formation of smog.
- Affecting the growth and the quality of plants and agricultural crops.
- Corrosion of some substances, such as plastics and rubber.

17 Ozone gas negatively affects the plants growth and their productivity when it is found in the troposphere.

Because it can cause burn of plant leaves, which reduces their ability to perform photosynthesis process and damage of plants and agricultural crops that affects their growth and quality.

18 Temperature is one of the most important climatic factors.

Because changes in temperature affect atmospheric pressure, wind, humidity, condensation, and rainfall and all of these factors influence the climate.

19 It is preferable to install an air conditioner high on a room's wall.

Because it cools the air, increasing its density and causing it to sink so that warmer less dense air rises to take its place, allowing the cool air to circulate throughout the room more effectively.

20 Air density is the highest within the first 30 km of the atmosphere.

Because Earth's gravity pulls air molecules downward, concentrating most of the atmosphere's mass within this first 30 km of altitude. Therefore, the air has its highest density through this altitude.

21 The values of atmospheric pressure and temperature are lower at the summit of a mountain than at its base.

* **Regarding atmospheric pressure:** As altitude increases, the weight of the air column above decreases, which causes the atmospheric pressure to decrease.

* **Regarding temperature:**

- As altitude increases, the lower atmospheric pressure causes the air to expand and its molecules to spread apart, decreasing its density.
- The air draws the energy needed for this expansion from the kinetic energy of its molecules, which in turn lowers the temperature.

22 Mountain climbers may suffer from the burst of blood capillaries in the nose.

As altitude increases, the atmospheric pressure decreases. So, the difference between the blood pressure inside the blood capillaries and the atmospheric pressure increases, which can cause the bursting of blood capillaries in the nose.

23 The body's production of red blood cells increases at high altitudes.

Because the amount of available oxygen that the body can obtain decreases with increasing altitude.

24 Red blood cells play an important role in transporting oxygen within the human body.

Because their cytoplasm contains the red-colored pigment (hemoglobin), which is responsible for transporting oxygen and a little amount of CO_2 within the human body.

25 Platelets have an important role during bleeding.

Because they participate in blood clotting during bleeding.

26 White blood cells have an important role in protecting the body from diseases.

Because they protect the body from bacteria, viruses, fungi and other foreign substances.

27 It is important to maintain a normal blood pressure rate in human.

To ensure the delivery of oxygen and nutrients to the tissues and for the overall health of the heart and blood vessels.

28 The difference in atmospheric pressure is the cause of wind.

Because wind is created by the horizontal movement of air from areas of high atmospheric pressure to areas of low atmospheric pressure.

29 Parenchyma tissues have the ability to perform photosynthesis.

Because they contain a large number of chloroplasts.

**30 * The cells of sclerenchyma tissue are rigid and impermeable to water.
* Sclerenchyma tissue works to provide a significant mechanical strength to the plant.**

Because of their very thick cell walls made of cellulose and lignin.

31 Humidity directly affects human comfort and health.

Because it controls the body's efficiency in getting rid of excess heat through the process of sweating, as water absorbs the heat needed for its evaporation from the body, which works to regulate the blood temperature.

32 The temperature of the air adjacent to the Earth's surface rises year after year.

Due to global warming caused by the increase in the percentage of greenhouse gases in the atmosphere, as the atmosphere allows the passage of short-wavelength solar radiation towards the Earth, which is absorbed by the Earth and then re-emitted as a long-wavelength thermal radiation. So, the greenhouse gases prevent this radiation from passing into outer space.

33 The disappearance of some coastal cities as a result of global warming phenomenon.

Due to the melting of ice masses at the two poles, which leads to a rise in the water level in the seas and oceans.

34 Afforestation is one of the most important methods to reduce global warming.

Because the presence of the large amount of vegetation helps to improve air quality by increasing photosynthesis, which has a fundamental role in absorbing carbon dioxide gas, which is considered the main cause of the rise in Earth's temperature, i.e. the occurrence of global warming phenomenon.

35 The oxygen supply to tissues decreases when exposed to carbon monoxide gas.

Because the binding strength of carbon monoxide to hemoglobin is about 200 - 250 times greater than that of oxygen, which leads to the formation of the relatively stable carboxyhemoglobin compound (HbCO), which prevents oxygen from binding to hemoglobin.

36 The accumulation of lactic acid and feeling fatigue and headache when exposed to carbon monoxide gas.

Due to the formation of the carboxyhemoglobin compound, which leads to a decrease in the oxygen supply to tissues (Hypoxia), so the cells do not get enough oxygen that is required for cellular respiration. As a result, cells begin to rely on anaerobic respiration, leading to the accumulation of lactic acid and feeling fatigue and headache.

37 Acid rain has a negative effect on the soil.

As acid rain replaces essential salts (such as calcium and magnesium salts) from the soil, which leads to a decrease in the soil fertility.

38 Meteorological monitoring stations around the world continuously measure various environmental and climatic changes.

For early detection of air pollution or dangerous weather phenomena (such as dust storms or heat waves).

39 The recovery of some coral areas in the Great Barrier Reef in Australia after 2016

Preventive steps were taken, such as reducing the resulted pollution from coastal activities, and temporarily restrict fishing and tourism based on what climate monitoring centres predicted of a marine heat wave and a significant rise in ocean water temperature along the Great Barrier Reef in Australia, which reduced the extent of losses and helped some coral areas to recover.

10 What happens when ?

1 The absence of carbon dioxide gas from the atmosphere, "regarding plants and animals life".

Plants don't perform photosynthesis process, which leads to stopping their growth and their death, therefore there will be no source for food and oxygen for the animals, so they die.

2 The percentage of oxygen gas in the atmosphere increases, "regarding combustion processes".

The strength of combustion increases because oxygen gas is the active element in the combustion process.

3 Ascending upwards above sea level, "regarding air density".

Air density decreases because gravity pulls air molecules downward, concentrating most of the atmosphere's mass within the first 30 km above the Earth's surface.

4 Gas molecules on a planet moved at a speed equal to or greater than its escape velocity "regarding the possibility of escaping the planet's gravity".

The gas molecules would be able to escape the planet's gravity.

5 The atmospheric pressure between two regions at the same horizontal level on the Earth's surface differs "regarding the direction of the wind between them".

The wind would blow from the region of high atmospheric pressure to the region of low atmospheric pressure.

6 A plant is devoid of parenchyma tissue.

The plant will lose its ability to perform many vital functions such as photosynthesis, storing nutrients and water, secreting the sap and helping in ventilation.

7 The absence of collenchyma tissue from the growing parts of a plant.

These parts will lose their flexibility and elasticity.

8 The absence of sclerenchyma tissue from a plant.

The plant will lose a significant mechanical strength due to the loss of the rigidity of its cells.

9 A plant is devoid of supportive tissues, "concerning the effect of wind on the plant".

This may cause the breaking of plant stems or the tearing leaves.

10 Lignin is deposited in the cell walls of collenchyma tissue.

The collenchyma tissue will lose its vitality and its rigidity will increase.

11 The humidity in air decreases, "regarding the rate of uptake of water and salts from the root to the leaves in plants".

The rate of transpiration will increase, and consequently, the rate of uptake of water and salts from the root to the leaves will increase.

12 The humidity in air increases, "regarding the efficiency of reducing the body temperature of animals".

The efficiency of reducing the body temperature of animals decreases.

13 The temperature decreases, "regarding the humidity of air".

Air humidity decreases.

14 The proportions of the gases that make up the atmosphere change.

The effectiveness of the atmosphere in maintaining a suitable temperature for the life of living organisms will decrease, and its ability to protect the Earth from harmful solar radiation will also decrease.

15 The levels of greenhouse gases in the atmosphere increases, "regarding the Earth's temperature".

It leads to gradual increase in the temperature of the Earth's surface year after year, which threatens the occurrence of environmental disasters, such as melting of ice and extreme climate changes.

16 The ice at the two poles melts due to the global warming phenomenon, "regarding the coastal cities and polar species".

This leads to:

- (1) The flooding of coasts and the disappearance of some coastal cities.
- (2) The extinction of some polar species, due to the destruction of their natural habitats.

17 Expanding in the use of the renewable energy, "regarding the average Earth's temperatures".

The average Earth's temperatures decreases, due to the decrease in the percentage of greenhouse gases in the atmosphere.

18 The incomplete combustion of fossil fuels.

This leads to the production of some environmentally polluting gases such as carbon monoxide.

19 A carbon monoxide molecule binds to the hemoglobin of red blood cells.

The carboxyhemoglobin compound (HbCO) is formed, which prevents oxygen from binding to hemoglobin.

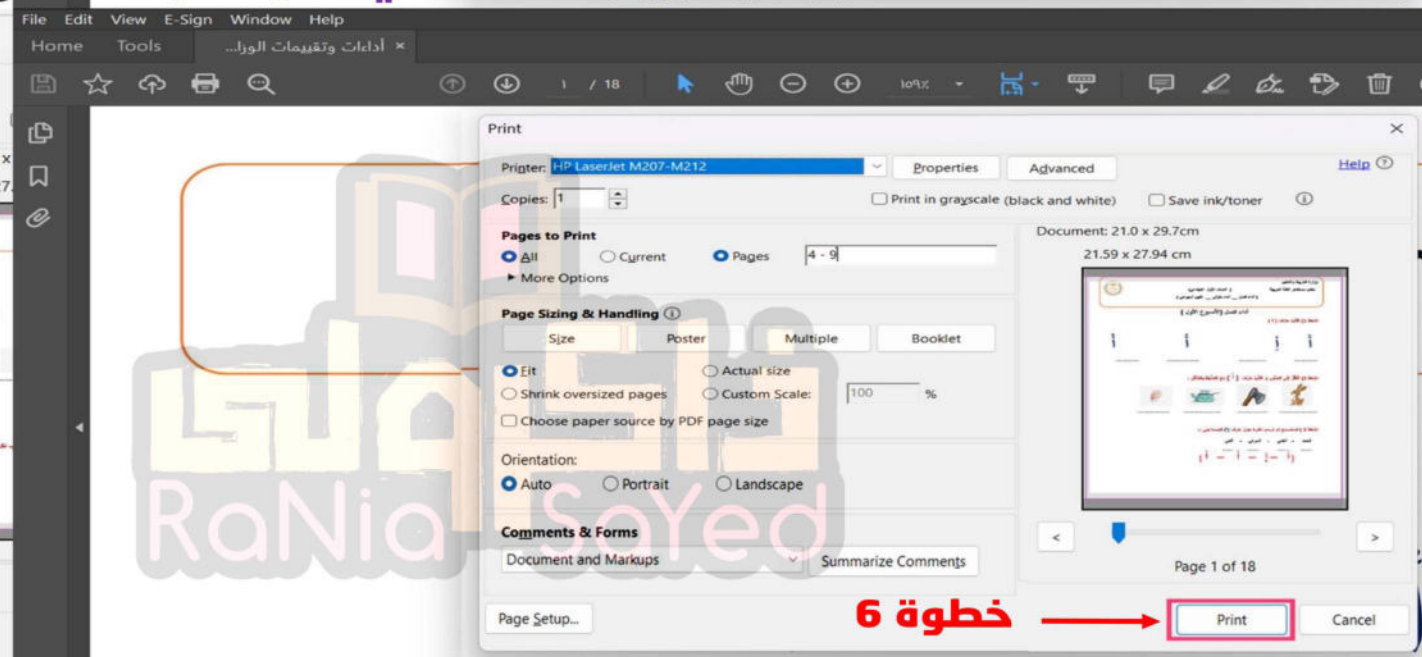
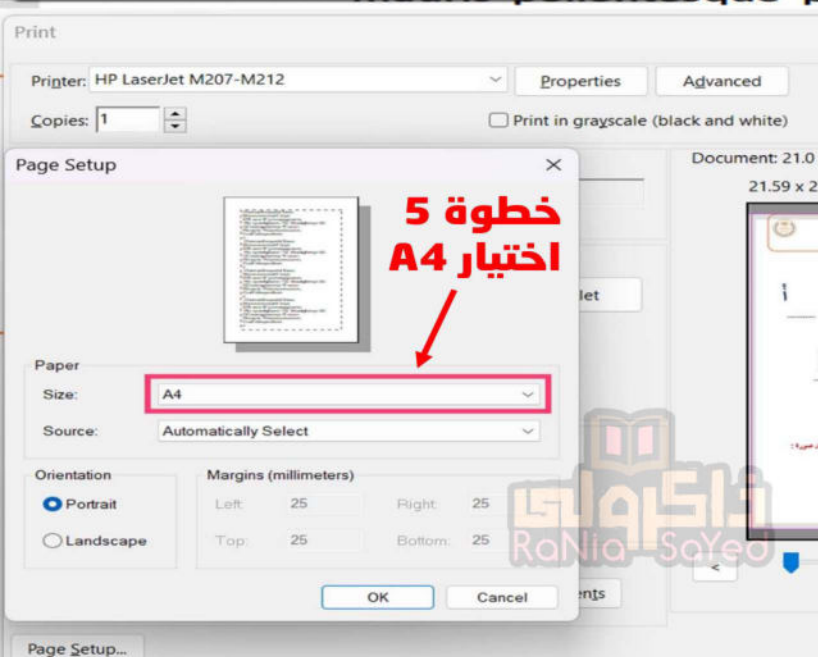
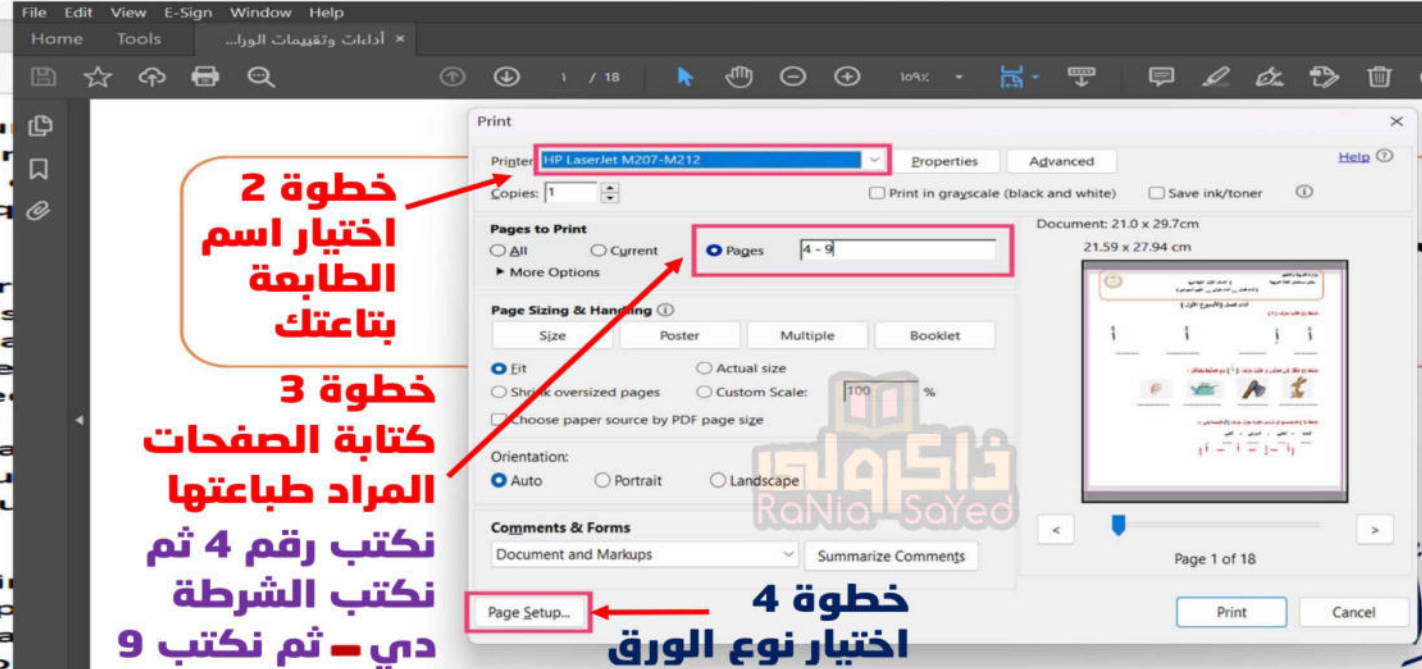
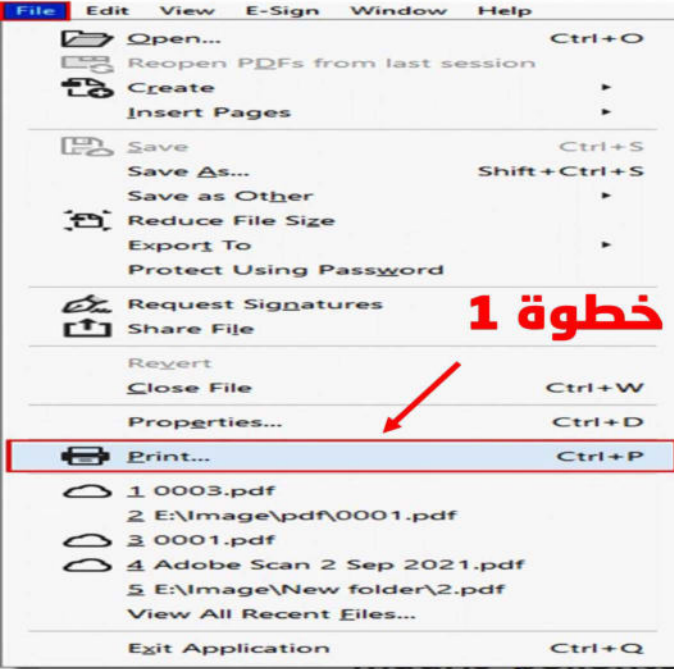
20 The binding of oxygen to hemoglobin decreases.

This leads to a decrease in the oxygen supply to the tissues (Hypoxia). Consequently, the cells will not get enough oxygen for cellular respiration, so the cells begin to rely on anaerobic respiration, which leads to the accumulation of lactic acid and feeling of fatigue and headache.

21 The concentration of the (HbCO) compound in the blood increases.

Serious symptoms such as dizziness, loss of consciousness and brain damage may occur.

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

الترم الاول



Exam 1



Answered

Choose the correct answer (1 : 20):

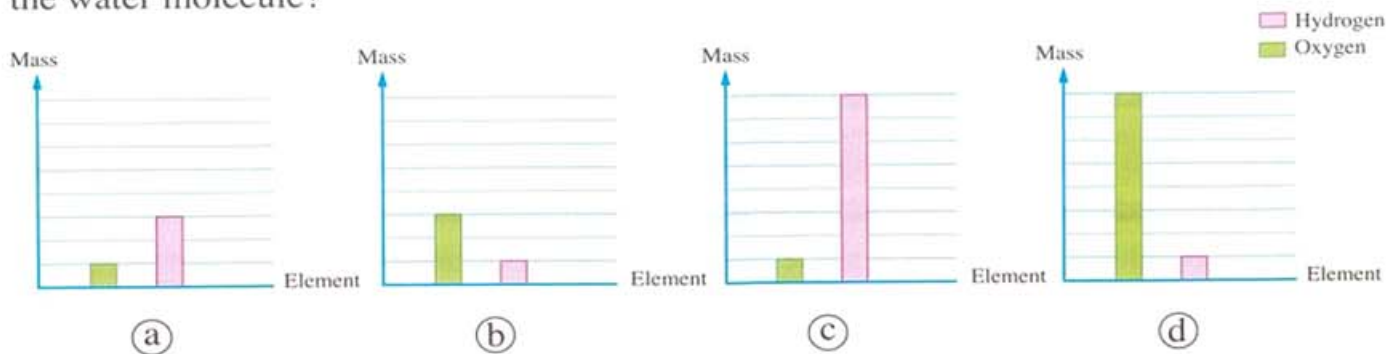
- 1 A food chain includes predatory fish, algae, zooplankton and small fish. So, what happens after the predatory fish feed on small fish in great numbers?
- (a) Zooplankton increase and algae decrease. (b) Zooplankton decrease and algae increase.
(c) Zooplankton and algae increase. (d) Zooplankton and algae decrease.
- 2 Which of the following correctly describes the wind between two regions and the atmospheric pressure at them?
- (a) The wind speed is high whenever the difference in atmospheric pressure between the two regions is small.
(b) The wind speed is low whenever the difference in atmospheric pressure between the two regions is small.
(c) Wind arises when the pressures are equal in the two regions.
(d) There is no relation between the wind and the atmospheric pressure.
- 3 Ray fish can live in deep depths under high water pressure, because they have

	Liver that contains	Skeleton
(a)	Low amount of oils	Bony
(b)	Low amount of oils	Cartilaginous
(c)	High amount of oils	Bony
(d)	High amount of oils	Cartilaginous

- 4 A student has recorded statements about some of the atmosphere layers, as follows:
- (I) It has the least temperature.
(II) In which most of the meteors that fall towards Earth are burnt up.
(III) It is used in wireless communications.
(IV) It is the preferable layer for aircraft flights.
- Which of the previous statements aircraft the mesosphere layer?
- (a) (I) and (III). (b) (II) and (IV).
(c) (I) and (II). (d) (III) and (IV).

- 5 Marine organisms produce CO_2 gas as a waste product resulted from process.
- (a) transpiration (b) catabolism
(c) photosynthesis (d) protein synthesis

- 6 Which of the following graphs represents the mass of each of hydrogen and oxygen in the water molecule?

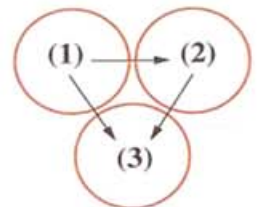


- 7 The opposite figure shows the molecular structure of one of the gases that exists in the atmosphere. What do you expect to happen to the rate of photosynthesis of plants on the Earth's surface when getting exposed to huge amounts of this gas?



- (a) Increases. (b) Decreases.
(c) Not affected. (d) The answer can't be determined.

- 8 The opposite figure represents the direction of water transfer by osmosis among three adjacent living cells. Which of the following represents the correct arrangement of cells from the least to the highest water concentration?



- (a) (2) → (1) → (3). (b) (2) → (3) → (1).
(c) (1) → (2) → (3). (d) (3) → (2) → (1).

- 9 When water vapor condenses, the temperature of the surrounding air

- (a) increases, as water vapor absorbs heat energy
(b) increases, as water vapor releases heat energy
(c) decreases, as water vapor absorbs heat energy
(d) decreases, as water vapor releases heat energy

- 10 Which of the following leads to a decrease in pH value of the rainwater if its percentage increases?

- (a) CaCO_3 (b) H_2O (c) NaCl (d) H_2SO_4

- 11 What is the correct order of the stages that a quantity of seawater goes through in order to return to seas again?

- (a) Evaporation → Condensation → Rainfall → Runoff.
(b) Rainfall → Runoff → Evaporation → Condensation.
(c) Runoff → Evaporation → Condensation → Rainfall.
(d) Condensation → Rainfall → Runoff → Evaporation.

12 The Earth retains its atmosphere, while the Mercury planet doesn't have an atmosphere, and this is because

- (a) the Earth's gravity is stronger
- (b) the Earth's gravity is weaker
- (c) the temperatures on the Earth's surface are higher
- (d) the Earth has a biosphere

13 In the following are statements for a student about the effect of solar radiation on aquatic environments:

- (I) Autotrophic organisms are found in abundance in the deep depths.
- (II) Living organisms in water of polar regions are negatively affected in winter due to the lack of food availability.
- (III) Coral reefs thrive in warm, shallow water.

Which of these statements are correct?

- (a) (I) and (II).
- (b) (II) and (III).
- (c) (I) and (III).
- (d) The three statements are correct.

14 Which of the following living organisms belongs to mollusks?

- (a) Shrimp.
- (b) Coral.
- (c) Ray.
- (d) Clam.

15 An amount of water of mass 1 kg at a temperature 10°C has lost an amount of heat of 37800 J through an interval of time (t_0), if you know that the specific heat of water is 4200 J/kg.K , then the density of water through that period (t_0)

- (a) decreases continuously
- (b) decreases then increases
- (c) increases continuously
- (d) increases then decreases

16 What happens to the volume of a quantity of pure water when its temperature is raised from 33°F to 39°F ?

- (a) It increases.
- (b) It decreases.
- (c) It decreases, then increases.
- (d) It does not change.

17 The opposite figure shows the settling position of an egg placed in a quantity of fresh water, when a large quantity of table salt is dissolved in water, then the egg

- (a) rises
- (b) sinks
- (c) remains in its position
- (d) the answer can't be determined



- 18 Which of the following represents the correct arrangement for the boiling points of the following solutions that have equal concentrations at the standard atmospheric pressure?
- (a) $\text{NaCl} < \text{MgCl}_2 < \text{Al}_2(\text{SO}_4)_3$ (b) $\text{NaCl} < \text{Al}_2(\text{SO}_4)_3 < \text{MgCl}_2$
(c) $\text{Al}_2(\text{SO}_4)_3 < \text{MgCl}_2 < \text{NaCl}$ (d) $\text{Al}_2(\text{SO}_4)_3 < \text{NaCl} < \text{MgCl}_2$

- 19 What is the probable result for increasing the temperature of an aquatic environment on the organisms that live in it?
- (a) The difficulty of respiration. (b) Increasing the photosynthesis process rate.
(c) Decreasing the calcification rate. (d) Increasing the living organisms activity.

- 20 Which of the following keep the liquidity of cell membranes and their stability to withstand high pressure in deep-depths fish?
- (a) Proteins. (b) Carbohydrates.
(c) Saturated fatty acids. (d) Unsaturated fatty acids

Answer the following questions (21 & 22):

- 21 Viperfish is considered as an example for the structural and physiological adaptations. Explain this.

.....
.....

- 22 Mention an example for the negative impact on the human body, due to losing a large amount of water from his body, and **how** can the body protect itself from that?

.....
.....

Exam 2 ? Answered

Choose the correct answer (1 : 20):

- 1 Which of the following **isn't** from the excretory substances in animals?
- (a) CO_2 gas. (b) Water vapor. (c) O_2 gas. (d) Urea.
- 2 Which of the following **isn't** from the cold-blooded organisms?
- (a) Fish. (b) Amphibians. (c) Reptiles. (d) Birds.
- 3 Deep-ocean fish develop certain adaptations in their cell membranes to adapt with through the levels of unsaturated fatty acids.
- (a) decreased light intensity / increasing (b) decreased light intensity / decreasing
(c) increased pressure / increasing (d) increased pressure / decreasing

4 Which of the following salts its ions remain in the solution without forming bonds with water molecules?

- (a) Sodium carbonate. (b) Sodium bicarbonate.
(c) Sodium chloride. (d) Ammonium chloride.

5 Which of the following components play(s) the essential role in blood clotting during bleeding?

- (a) Platelets. (b) Red blood cells. (c) White blood cells. (d) Plasma.

6 Which of the following living organisms doesn't have contractile vacuole?

- (a) *Amoeba*. (b) *Paramecium*. (c) Shark fish. (d) *Euglena*.

7 If the solubility of carbon dioxide gas in the aquatic environment (X) is more than its solubility in the aquatic environment (Y). Which of the following is the reason for that?

	Aquatic environment (X)	Aquatic environment (Y)
(a)	The water temperature is higher	The water temperature is lower
(b)	Freshwater	Saltwater
(c)	Water is stable	Water is turbulent
(d)	The low number of dead fish	The high number of dead fish

8 Which of the following gases contributes to the formation of smog?

- (a) Oxygen. (b) Sulphur dioxide. (c) Nitrogen. (d) Argon.

9 The farthest atmospheric layer from the Earth's surface is

- (a) troposphere (b) mesosphere (c) thermosphere (d) exosphere

10 Which of the following enhances the ecological balance in the aquatic ecosystem?

- (a) Reducing the metabolic rate of living organisms.
(b) Reducing the interaction among living organisms' species.
(c) Increasing the acidification process in water.
(d) Increasing the photosynthesis rate of phytoplankton.

11 How far are these statements correct "the plant cell walls contain cellulose", "all the plant cells can perform photosynthesis process"?

- (a) The two statements are correct.
(b) The first statement is correct and the second statement is wrong.
(c) The first statement is wrong the second statement is correct.
(d) The two statements are wrong.

- 12** In houses, heaters are placed on the floor of a room, because when their surrounding air heats up, it
(a) rises up because it is denser than cold air
(b) rises up because it is less dense than cold air
(c) settles at the same level because it is denser than cold air
(d) settles at the same level because it is less dense than cold air
- 13** If the temperatures at the base and the top of Cairo Tower are 30°C and 28.8°C respectively, then the height of the tower is approximately equal to
(a) 334 m (b) 279 m (c) 185 m (d) 180 m
- 14** The amount of heat required to raise a certain amount of a liquid from a certain temperature to its boiling point at sea level relative to that at the top of a mountain is
(a) greater than one (b) less than one (c) equal to one (d) unpredictable
- 15** A thin slide is suspended at a constant depth inside water placed in a container, so the force exerted by the water on the slide is greater, when
(a) the mass of the slide is great
(b) the mass of the slide is small
(c) the surface area of the slide is large
(d) the surface area of the slide is small
- 16** Which of the following is considered a physiological adaptation for deep-ocean fish?
(a) The compressed body. (b) The strong arteries and veins.
(c) Modification of blood pressure. (d) The large-sized gills.
- 17** The breakdown of glucose molecules occurs in the living cells through a biological process called
(a) excretion (b) catabolism
(c) anabolism (d) growth
- 18** In which of the following plant tissues lignin enters in their cell walls structure?
(a) Parenchyma tissue. (b) Sclerenchyma tissue.
(c) Collenchyma and xylem tissues. (d) Parenchyma and collenchyma tissues.
- 19** An amount of water of mass m is poured in a container, then another amount of water of mass m is added to it at the same temperature, then the specific heat of water
(a) is doubled (b) is tripled
(c) doesn't change (d) is halved

- 20** Three glass vessels, each of them contains the same volume of a different liquid, a hydrometer was used to measure the density of the three liquids, so its position at equilibrium was as shown in the following figures, then the correct order of these figures according to the mass of the liquid in each vessel is

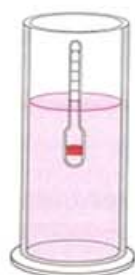


Figure (1)

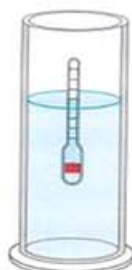


Figure (2)

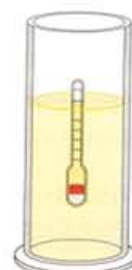


Figure (3)

- (a) $(3) > (2) > (1)$
 (b) $(2) > (3) > (1)$
 (c) $(1) > (2) > (3)$
 (d) $(1) > (3) > (2)$

Answer the following questions (21 : 23):

- 21** Egypt resorts to construct many power generating stations by using solar panels. Show the importance of this, according to your study of the concept of sustainability.

.....

- 22** The following table shows the colors of one of the prepared indicators from the flowers of a plant:

Color	Red			Purple			Blue		Greenish-blue		Yellowish-green	
pH	1	2	3	4	5	6	7	8	9	10	11	12

What is the formed color when adding drops of this indicator to ammonium bicarbonate solution?

.....

- 23** Gulf stream is considered an example of the effect of the solar radiation on water currents in the Atlantic Ocean. Explain this.

.....

Exam 3

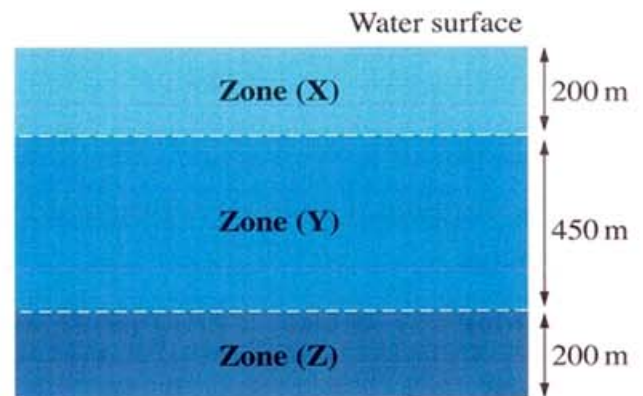


Answered

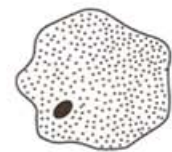
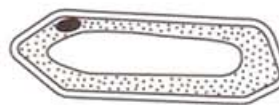
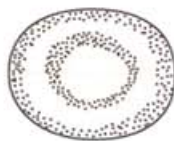
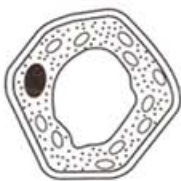
Choose the correct answer (1 : 20):

- 1 When the temperature of a body changes from 50°F to 280 K , the internal energy of the body
- (a) decreases (b) increases
(c) doesn't change (d) the answer can't be determined
- 2 In the following, the specifications of four water samples, each of mass 1 kg . Two samples are of saltwater with the same concentration and two samples are of freshwater, which of these samples has the highest density?
- (a) Saltwater sample at 4°C . (b) Freshwater sample at 4°C .
(c) Saltwater sample at 8°C . (d) Freshwater sample at 8°C .

- 3 The opposite figure represents three zones (X), (Y) and (Z) in the ocean water, which of these zones is the most suitable for the existence of autotrophic algae in it?
- (a) Zone (X).
(b) Zone (Y).
(c) Zone (Z).
(d) The three zones are of the same probability.



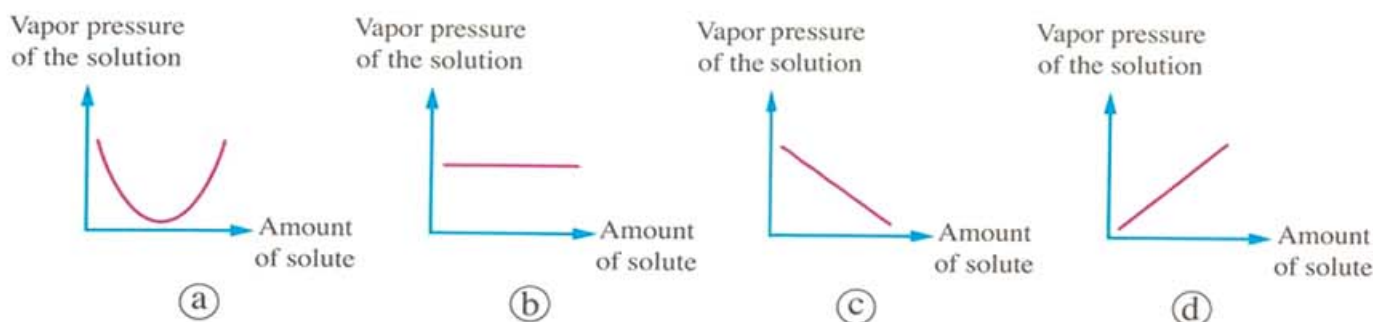
- 4 Which of the following is/are present in all the illustrated cells?



- (a) Cell membrane. (b) Cell wall. (c) Plastids. (d) Nucleus.

- 5 When sodium bicarbonate solution is added to a cylinder containing an amount of ammonium chloride, then the pH value of the contents of the cylinder
- (a) decreases (b) increases
(c) remains constant (d) unpredictable

- 6 Which of the following graphs represents the relation between the vapor pressure of the solution and the amount of solute at temperature ($T = 25^{\circ}\text{C}$)?



- 7 Which of the following is **not** from the structural adaptations of dolphins?

- (a) Streamlined shape. (b) The presence of fins.
(c) The presence of breathing openings. (d) Large-sized eyes.

- 8 When the nutrients excessively increase in the aquatic system, this leads to

- (a) decreasing the growth rate of plants (b) increasing the biodiversity
(c) abnormal algal blooming (d) the stability of the ecosystem

- 9 Which of the following statements is correct about the adaptation of shark fish with water pressure?

- (a) It has air bladder, which helps it to control its buoyancy.
(b) It has air bladder, which helps it to regulate its temperature.
(c) It has bony skeleton, which provides a strong support for its body.
(d) It has cartilaginous skeleton, which gives it the required flexibility.

- 10 Which of the following arrangements correctly describes the order of forming sulphuric acid rain?

- (a) $\text{SO}_2 \longrightarrow \text{H}_2\text{SO}_4 \longrightarrow \text{SO}_3$ (b) $\text{SO}_2 \longrightarrow \text{SO}_3 \longrightarrow \text{H}_2\text{SO}_4$
(c) $\text{SO}_3 \longrightarrow \text{SO}_2 \longrightarrow \text{H}_2\text{SO}_4$ (d) $\text{H}_2\text{SO}_4 \longrightarrow \text{SO}_2 \longrightarrow \text{SO}_3$

- 11 Water in the liquid state contains

- (a) covalent bonds only (b) hydrogen bonds only
(c) covalent and hydrogen bonds (d) ionic and hydrogen bonds

- 12 Two identical quantities (1) and (2) of the same gas, if the temperature of quantity (1) is greater than that of quantity (2). So, the ratio between the effective velocity of the two quantities molecules $\left(\frac{(v_{\text{rms}})_1}{(v_{\text{rms}})_2} \right)$ is

- (a) greater than 1 (b) less than 1 (c) equal to 1 (d) indeterminable

13 When moving a barometer from the foot of a mountain to its top, the amount of mercury in the basin

- (a) decreases
- (b) increases
- (c) doesn't change
- (d) the answer can't be determined

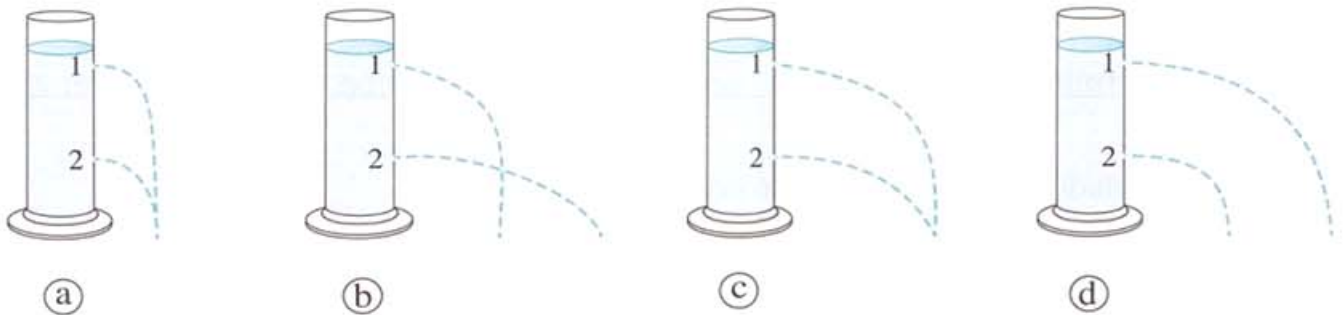
14 The two processes in which the physical state of water is similar immediately after their occurrence are

- (a) evaporation and condensation
- (b) condensation and transpiration
- (c) transpiration and evaporation
- (d) condensation and freezing

15 Which of the following layers has the least thickness?

- (a) Ozone layer.
- (b) Tropopause layer.
- (c) Ionosphere layer.
- (d) All three layers have equal thickness.

16 Which of the following figures represents the correct path of the water getting out from the two openings ① and ② of a vessel containing water?



17 In the life cycle of salmon fish, which of the following stages live all of its life in an aquatic environment of a low osmotic pressure?

- (a) Eggs only.
- (b) Adult salmon only.
- (c) Eggs and young salmon.
- (d) Young and adult salmon.

18 Which of the following is from the reasons of global warming phenomenon?

- (a) Fossil fuel combustion.
- (b) Increasing the rate of photosynthesis.
- (c) Animals overhunting.
- (d) Industrial wastewater treatment.

19 A body has a mass of 70 kg, a temperature of 98.6°F and a specific heat of 3400 J/kg.K, the required amount of heat that is gained by the body to raise its temperature to 102.2°F equals

- (a) 8.6×10^5 J
- (b) 4.8×10^5 J
- (c) 4.3×10^5 J
- (d) 2.4×10^5 J

20 What is the effect of lens absorption to UV rays on the light transmittance to retina?

- (a) The light transmittance increases.
- (b) The light transmittance decreases.
- (c) It doesn't affect the light transmittance.
- (d) It may increase or decrease the light transmittance.

Answer the following questions (21 & 22):

21 Compare between: wood frog, icefish and thorny devil lizard, "according to: the way of adaptation with the temperature of the environment where they live".

.....

.....

22 The following diagram represents an aquatic food chain:



What is the effect of decreasing the level of the dissolved carbon dioxide gas in water on the energy flow through this chain?

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.....

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Exam 4



Answered

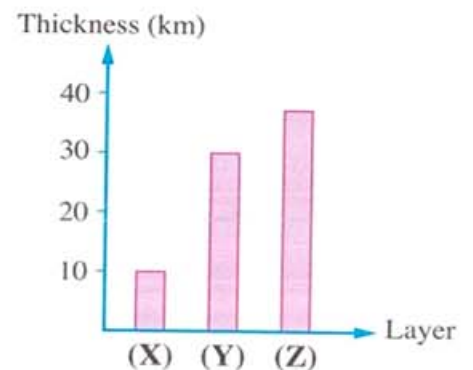
Choose the correct answer (1 : 20):

1 How many hydrogen atoms are involved in forming 6 hydrogen bonds between a number of water molecules?

- (a) 6
- (b) 12
- (c) 18
- (d) 24

2 The opposite figure represents the average thickness of the three closest layers of the atmosphere to the Earth's surface, in which of these layers does ozone gas have a harmful effect on the living organisms?

- (a) Layer (X).
- (b) Layer (Y).
- (c) Layer (Z).
- (d) Layers (Z) and (Y).



3 Which of the following is **not** a characteristic of the environment?

- (a) A whole system whose components cannot be separated.
- (b) Includes biotic and abiotic components.
- (c) Influenced by a set of variables surrounding its components.
- (d) Consists of six interconnected spheres.

4 A salty solution of mass 1 kg and volume $9.8 \times 10^{-4} \text{ m}^3$, so its relative density equals

(Where: the density of water = 1000 kg/m^3)

- (a) 0.98
- (b) 1
- (c) 1.02
- (d) 1.04

5 The opposite figure represents four regions of electromagnetic spectrum, which of the following represents the regions of spectrum (A) and spectrum (B) respectively?

B	A	Ultraviolet ray	Visible light
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- (a) Radio waves, Infrared rays.
- (b) X-rays, Gamma rays.
- (c) Infrared rays, Radio waves.
- (d) Gamma rays, X-rays.

6 If you know that the air temperature in a certain area on the Earth's surface is 10.72°C , then the temperature at the top of a mountain with a height of 880 m in this area equals

- (a) 373 K
- (b) 1°C
- (c) 41°F
- (d) 5°F

7 Which of the following organs in the body of Nile tilapia fish help(s) it to float?

- (a) Kidneys.
- (b) Skin.
- (c) Gills.
- (d) Air bladder.

8 One of the reasons why polar bear is at the risk of extinction is

- (a) the increase in the ice cap
- (b) the extreme cold at the North pole
- (c) the destruction of its original habitat
- (d) both (a) and (b)

9 The pH values of different solutions range from

- (a) 0 to 7
- (b) 7 to 14
- (c) 0 to 14
- (d) 7 to 10

10 Which of the following enzymes is highly specific?



(a)



(b)



(c)



(d)

- 11 In the following figures, the heat is transferred either from the hand or to it,

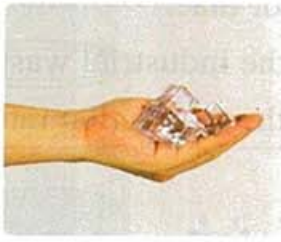


Figure (1)



Figure (2)

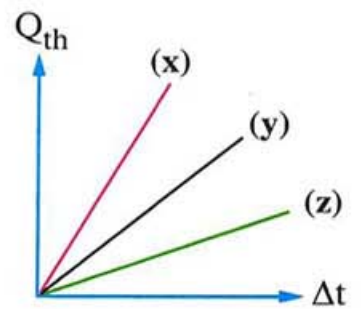


Figure (3)

In which figure is the heat transferred by conduction to the hand?

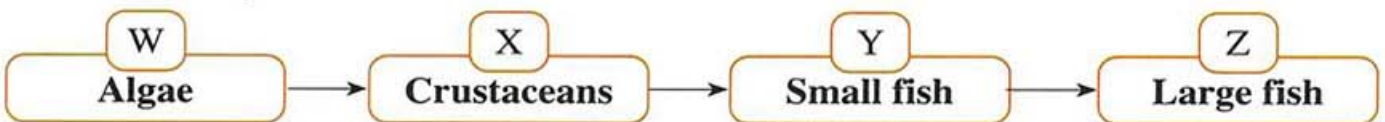
- (a) In figure (1). (b) In figure (2). (c) In figure (3). (d) In all figures.

- 12 The opposite graph represents the relation between the amount of heat (Q_{th}) that is gained by three equal masses of different substances (x), (y) and (z), and the change in temperature (Δt) for each of them. So, the correct arrangement of the specific heat for the three substances is



- (a) $c_z > c_y > c_x$ (b) $c_x > c_y > c_z$
(c) $c_x > c_z > c_y$ (d) $c_x = c_y = c_z$

- 13 In the following food chain:



All the following are considered from the reasons for the occurrence of an imbalance in this food chain, **except**

- (a) increasing the number of (W) and (X)
(b) the predation of (Z) to (Y) by great numbers
(c) increasing the number of (X)
(d) the overfishing of (Z)

- 14 What happens to the transpiration rate in the plant, when the humidity level decreases in the atmosphere at the same temperature?

- (a) Increases. (b) Decreases.
(c) Doesn't change. (d) The answer can't be determined.

- 15 Which of the following is considered an example for the behavioral adaptation in living organisms?

- (a) Sweat secretion in human. (b) Strong claws of raptors.
(c) The hibernation of tortoises. (d) The monkeys with long arms.

- 16** Although the solubility of CO_2 in water is higher than the solubility of O_2 in water, the percentage of O_2 gas in water exceeds the percentage of CO_2 in some aquatic environments. So, which of the following may be the reason for that?
- (a) The abundance of phytoplankton. (b) Increasing the industrial waste.
(c) Increasing the number of dead fish. (d) Increasing the respiration rate of fish.

- 17** The following figure shows the molecular structure of two compounds, as hydrogen bonds are found among the molecules of compound (1), while being absent among the molecules of compound (2) despite their similarity in structure. What is the reason for that?



- (a) The difference in the electronegativity between atoms (X) and (H) is higher.
(b) The difference in the electronegativity between atoms (Y) and (H) is higher.
(c) Molecule (1) is non-polar, while molecule (2) is polar.
(d) The electronegativity of atom (X) is higher than that of atom (Y).
- 18** What is the effect of acid rain on the agricultural soil?
- (a) Reducing nutrients. (b) Decreasing soil humidity.
(c) Decreasing temperature. (d) Increasing soil fertility.
- 19** Four thin slides (X), (Y), (Z) and (K) with areas A , $2A$, A , $2A$ respectively are suspended inside a container of water at a depth of h , h , $2h$, $2h$ from water surface respectively. Which of these slides is affected by the greater pressing force?
- (a) Slide (X). (b) Slide (Y). (c) Slide (Z). (d) Slide (K).
- 20** A sea breeze is
- (a) the warm air moving from the water surface to the land
(b) the warm air moving from the land toward the sea
(c) the cold air moving from the water surface to the land
(d) the cold air moving from the land toward the sea

Answer the following questions (21 : 23):

- 21** Why is the aurora phenomenon observed specifically at the Earth's North and South Poles?

.....
.....

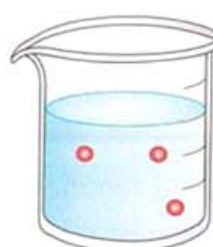
- 22** The following figures express 4 identical beakers, each of them contains a solution of different concentration for the same non-volatile solute at the same temperature. So, if the circles refer to the dissolved substance.



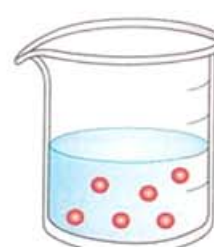
A



B



C



D

Which of these solutions has the highest boiling point? **Explain your answer.**

- 23** If the pressure of an enclosed gas is 1520 mm Hg, **calculate** its pressure in the unit of bars.

Exam 5 ? Answered

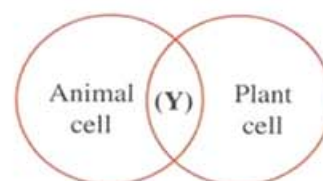
Choose the correct answer (1 : 20):

- 1** All of the following occur when the relative humidity in air increases, **except**

- (a) a decrease in the rate of transpiration in the plant
- (b) an increase in the efficiency of the animal's body to lower its temperature
- (c) a decrease in the rate of lifting water and salts from the root to leaves in plants
- (d) a decrease in sweat evaporation rate in animals

- 2** In the opposite diagram, which of the following represents (Y) that expresses a common structure between the two cells?

- (a) Plasma membrane. (b) Chloroplast.
- (c) Cell wall. (d) Large vacuoles.



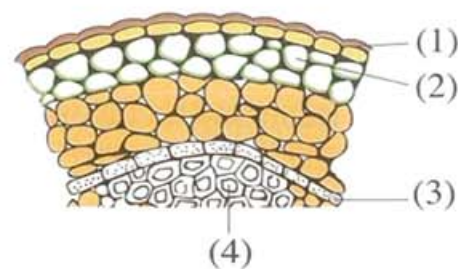
- 3** The solubility of a gas in solution can be measured from the relation

- (a) mass of the dissolved gas $\times$ volume of the solution
- (b) $\frac{\text{mass of the dissolved gas}}{\text{volume of the solution}}$
- (c) mass of the dissolved gas $-$ volume of the solution
- (d) mass of the dissolved gas $+$ volume of the solution

- 4** Which of the following is greater for pure water molecules at 1°C than at 4°C?
- (a) Vibration amplitude.
 - (b) Speed.
 - (c) Mass.
 - (d) Intermolecular spaces.
-
- 5** Decreasing the percentage of CO₂ in water leads to
- (a) increasing the rate of photosynthesis process
 - (b) reducing water acidity
 - (c) increasing energy that reaches predators
 - (d) reducing the pH value of water
-
- 6** Which of the following is an example for the structural adaptation in aquatic living organisms?
- (a) Salmon migration for reproduction.
 - (b) Increased respiration efficiency of deep-sea fish.
 - (c) Swim bladder in some fish.
 - (d) Venom secretion in some fish.
-
- 7** In the hydrological cycle, water can return to the sea through
- (a) condensation or evaporation
 - (b) condensation or runoff
 - (c) evaporation or rainfall
 - (d) rainfall or runoff
-
- 8** Which of the following is from the uses of climate models?
- (a) Measuring the concentration of greenhouse gases.
 - (b) Measuring wind speed.
 - (c) Tracking the recovery of the ozone layer.
 - (d) Forecasting changing rainfall patterns.
-
- 9** Producing sounds by whales to communicate is considered
- (a) structural adaptation only
 - (b) behavioral adaptation only
 - (c) structural and physiological adaptations
 - (d) behavioral and functional adaptations
-
- 10** The pH value of pure water increases when is dissolved in it.
- (a) carbon dioxide gas
 - (b) ammonium bicarbonate salt
 - (c) ammonium chloride salt
 - (d) sodium bicarbonate salt
-
- 11** The following are the steps for the formation of ozone gas in the stratosphere:
- (I) A single oxygen atom binds with an oxygen molecule.
 - (II) The covalent bond between the two oxygen atoms in the oxygen molecule is broken down.
 - (III) Short-wavelength ultraviolet radiation falls on an oxygen molecule.
- The correct order for these steps is
- (a) I → II → III
 - (b) III → II → I
 - (c) III → I → II
 - (d) I → III → II

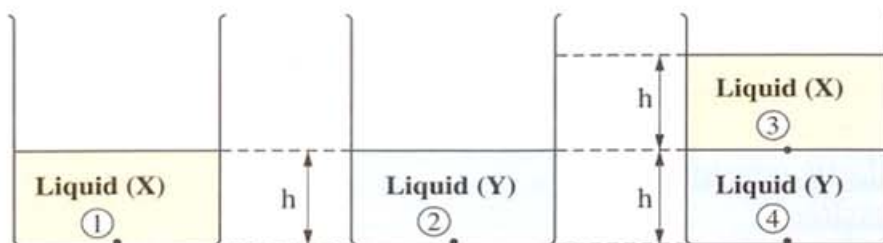
- 12** What is the probable effect of global warming on seas and oceans?
 (a) Reducing biodiversity in seas. (b) Decrease in sea level.
 (c) Decrease in water temperature. (d) Regression of ocean water.
-
- 13** If the latent heat of vaporization of water is equal to (E), then in order for a quantity of water with a mass of 5 kg to change from the liquid state at 100°C to the gaseous state at 100°C, it must
 (a) absorb (E) of thermal energy
 (b) absorb (5E) of thermal energy
 (c) release (E) of thermal energy
 (d) release (5E) of thermal energy
-
- 14** Which of the following choices is not from the environmental protection practices?
 (a) Reliance on renewable energy.
 (b) Reducing plastic consumption.
 (c) Urban expansion.
 (d) Reducing coal usage.
-
- 15** The dissolution of a solid salt in water producing an acid and a base one or both is/are weak, is known as
 (a) solubility
 (b) hydrolysis of salts
 (c) acid-base balance.
 (d) diffusion
-
- 16** If the boiling point of a liquid is X°C at sea level and becomes Y°C on the top of a mountain, which of the following expresses the ratio $\frac{X}{Y}$?
 (a) It is greater than one.
 (b) It is equal to one.
 (c) It is less than one.
 (d) It is equal to zero.
-
- 17** Which of the following types of matter takes the shape of its container while maintaining a constant volume?
 (a) Solids. (b) Liquids.
 (c) Gases. (d) All matter.
-
- 18** A piece of aluminum of mass 0.025 kg and temperature 100°C was thrown in an amount of water of mass 0.064 kg and temperature (t) in Celsius. So, the system final temperature became 40°C. If you know that the specific heat of water and aluminum respectively are 4200 J/kg.K and 897 J/kg.K. Assuming that there is no thermal leakage from the system, then the water temperature (t) before throwing the aluminum piece in it equals
 (a) 5°C (b) 25°C (c) 35°C (d) 40°C

- 19 The opposite figure represents a group of plant tissues in a stem of a higher plant, what is the tissue whose cell walls consist of cellulose and pectin?



- (a) (1). (b) (2).
(c) (3). (d) (4).

- 20 Three containers, each containing a quantity of liquid or two immiscible liquids are represented by the following figures:



So, the correct order of pressures at points ①, ②, ③ and ④ that are shown in the figures is

- (a) $P_4 > P_3 = P_2 > P_1$ (b) $P_4 > P_3 > P_2 = P_1$
(c) $P_4 > P_2 > P_1 = P_3$ (d) $P_4 = P_2 = P_1 > P_3$

Answer the following questions (21 & 22):

- 21 Explain:

(a) Increasing the number of red blood cells for people who live in mountaintops.

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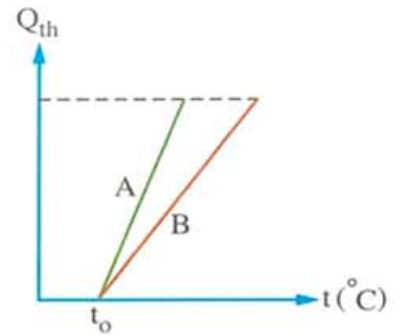
(b) Algae and phytoplankton are abundant in the surficial layers of water bodies.

.....
.....

- 22 "The percentages of the atmospheric components are changing through various natural processes". How far is this statement correct? Support your answer with an example.

.....
.....

- 6 Two quantities of two liquids A and B with the same mass were heated from a temperature t_0 and the opposite graph represents the relation between the amount of heat (Q_{th}) absorbed by each liquid and its temperature (t), so which liquid has a higher specific heat?

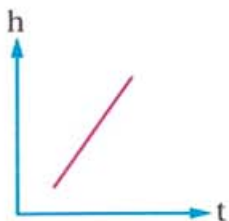


- (a) Liquid A.
- (b) Liquid B.
- (c) The two liquids have the same specific heat.
- (d) The answer cannot be determined.

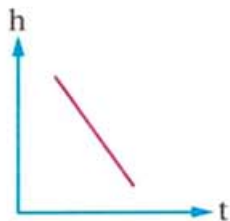
- 7 Gulf stream is oceanic current that flows towards Western Europe and it

- (a) cold – enhances marine biodiversity
- (b) warm – reduces marine biodiversity
- (c) warm – enhances marine biodiversity
- (d) cold – reduces marine biodiversity

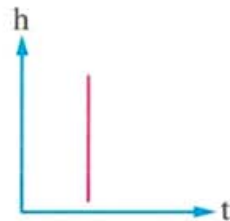
- 8 Which of the following graphs represents the relation between the altitude (h) above the Earth's surface and the air temperature (t) in troposphere layer?



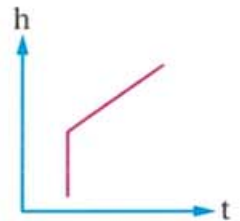
(a)



(b)



(c)



(d)

- 9 As the concentration of dissolved substances in water increases, all of the following are correct, **except**

- (a) the vapor pressure decreases
- (b) the freezing point decreases
- (c) the osmotic pressure increases
- (d) the boiling point decreases

- 10 The type of chemical bonds of water in its vapor state is

- (a) hydrogen bonds
- (b) double covalent bonds
- (c) single covalent bonds
- (d) both covalent and hydrogen bonds

- 11 Nitrogen gas represents 78% of

- (a) the mass of the atmosphere
- (b) the weight of the atmosphere
- (c) the volume of the atmosphere
- (d) the mass and weight of the atmosphere

- 12 At which of the following temperatures does pure water exist in its liquid state under normal conditions?

- (a) 4°F
- (b) 25°F
- (c) 122°F
- (d) 300°F

- 13** How does the thorny devil lizard adapt to the high temperatures and dry environment of the desert?
- (a) It changes the color of its skin to reflect more sunlight and reduce the heat absorption.
 - (b) It increases its heartbeats rate to increase the blood flow to the skin to cool it.
 - (c) It collects moisture from the air and directs it to its mouth through small channels on the surface of its skin.
 - (d) It stores small amounts of fats to cool its body.
- 14** At one stage of ozone formation, an oxygen molecule undergoes photodissociation, where the bond of the molecule is broken as a result of
- (a) emission of visible light photons
 - (b) emission of ultraviolet photons
 - (c) absorption of visible light photons
 - (d) absorption of ultraviolet photons
- 15** What happens to the area of ice cap on Earth as a result of global warming?
- (a) Increases.
 - (b) Decreases.
 - (c) Doesn't change.
 - (d) The answer can't be determined.
- 16** What is the most active organelle during practicing physical activities?
- (a) Vacuole.
 - (b) Endoplasmic reticulum.
 - (c) Mitochondrion.
 - (d) Nucleus.
- 17** The ratio between the solubility of carbon dioxide gas to the solubility of oxygen gas in water
- (a) is greater than 1
 - (b) is less than 1
 - (c) is equal to 1
 - (d) the answer can't be determined
- 18** Which of the following is **not** from the effects of gas oxides and acid rain?
- (a) Deformation of plant stomata.
 - (b) Increased soil fertility.
 - (c) Reduction of respiratory capacity.
 - (d) Corrosion of historic buildings.
- 19** Which of the following is correct about viperfish?
- (a) It exists in polar regions.
 - (b) It has an air bladder.
 - (c) It has high levels of haemoglobin.
 - (d) It has breathing openings.
- 20** How does the over consumption of small fish affect the aquatic ecosystem?
- (a) It participates in improving the aquatic plants growth.
 - (b) It leads to a disturbance in the numbers of zooplankton.
 - (c) It improves the energy balance among living organisms.
 - (d) It increases the water quality due to decreased pollution.

Answer the following questions (21 & 22):

- 21** Mention one of the reasons for the formation of ocean currents, and **what** is the importance of these currents?

.....
.....

- 22** Mention two biological adaptations for the aquatic organisms that live at deep-depths to adapt with the high pressure in these depths.

.....
.....

Exam

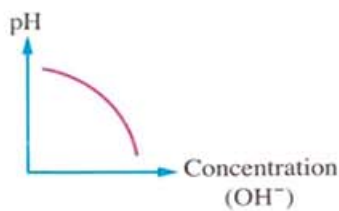
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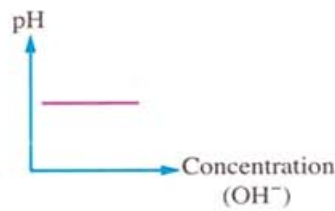
Answered

Choose the correct answer (1 : 20):

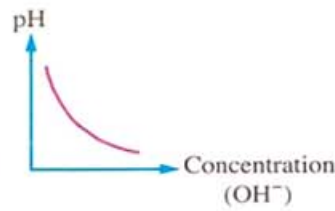
- 1** Which of the following graphs expresses the relation between the pH value and the concentration of (OH^-) ions?



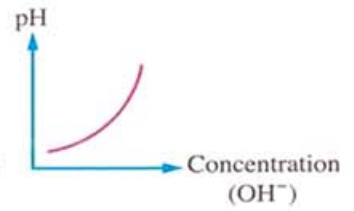
(a)



(b)



(c)



(d)

- 2** A quantity of pure water has a volume of 1 m^3 at a temperature of 4°C , its temperature dropped to the freezing point, then the volume of this quantity when it turns into ice with a density of 917 kg/m^3 is approximately equal to

(a) 1.03 m^3

(b) 1.05 m^3

(c) 1.09 m^3

(d) 1.04 m^3

- 3** Which of the following statements is correct about collenchyma tissue?

(a) It is composed of non-living rigid cells.

(b) It provides some strength in addition to elasticity and flexibility to the plant.

(c) It forms most of the soft tissues in the plant.

(d) Its cell walls consist of cellulose and lignin.

- 4** The ratio between the osmotic pressure of fresh water to the osmotic pressure of body fluids inside fish that live in this water is

(a) greater than 1

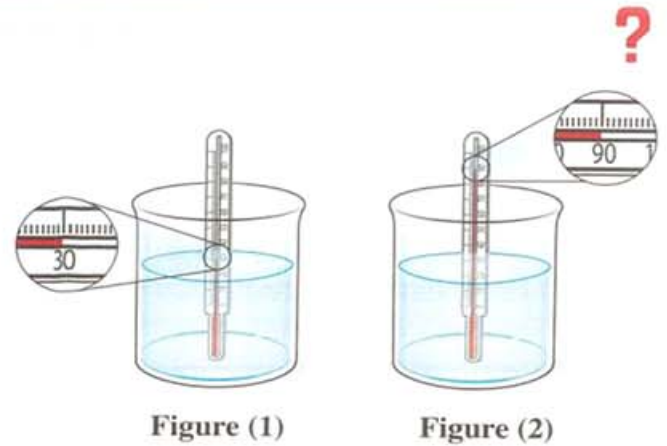
(b) equal to 1

(c) less than 1

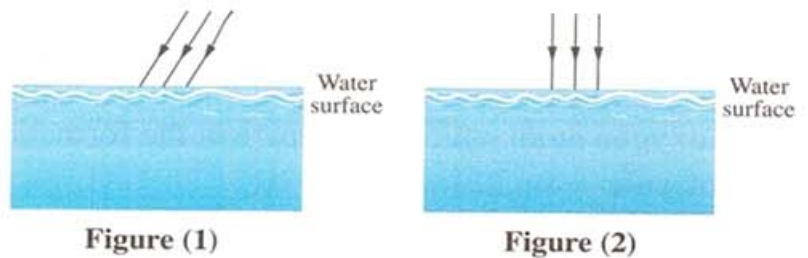
(d) the answer can't be determined

- 5 A beaker contains 220 g of water as shown in figure (1). If the specific heat of water is 4200 J/kg.K , so the amount of heat required to raise the temperature of water to be as shown in figure (2) is

(a) 55440 J (b) 81900 J
(c) 44550 J (d) 95550 J



- 6 Two beams of solar radiation of equal intensity are incident on the surface of water, one is inclined and the other is perpendicular, as shown in the opposite figures, so the light energy that penetrates the surface will be



(a) greater in figure (1) (b) greater in figure (2)
(c) equal in the two figures (d) zero in the two figures

- 7 A fish with a body surface area of 0.1 m^2 is at a depth of 5 m from the water surface, then the pressing force acting on the body of the fish is equal to
(Knowing that: $1 \text{ atm} = 1.013 \times 10^5 \text{ N/m}^2$)

(a) 10^3 N (b) $5.1 \times 10^3 \text{ N}$
(c) $1.5 \times 10^4 \text{ N}$ (d) $2.5 \times 10^4 \text{ N}$

- 8 If the boiling point of a liquid at the top of a mountain is 110°C , then the boiling point of the same liquid at the Earth's surface could be

(a) higher than 383 K (b) equal to 383 K
(c) less than 383 K (d) the answer can't be determined

- 9 Which of the following are always exist in the second trophic level of the food chain?

(a) Plants. (b) Lions. (c) Rabbits. (d) Fungi.

- 10 If the atmospheric pressure at the top of the stratosphere is P_1 , the atmospheric pressure at the top of the troposphere is P_2 , and at the top of the mesosphere is P_3 , which of the following relations is correct?

(a) $P_2 > P_1 > P_3$ (b) $P_1 > P_2 > P_3$
(c) $P_3 > P_1 > P_2$ (d) $P_3 > P_2 > P_1$

- 11 Polar winds are cold and and they blow from areas with atmospheric pressure around polar regions.

(a) wet - low (b) dry - low (c) warm - high (d) dry - high

12 What is the purpose of using renewable energy sources?

- (a) Reducing the use of fossil fuel.
- (b) Reducing daily energy consumption.
- (c) Increasing greenhouse gas emissions.
- (d) Increasing the frequency of extreme weather phenomena.

13 The ratio of the area occupied by water to the area of land on the Earth's surface is equal to

- (a) $\frac{3}{7}$
- (b) $\frac{7}{10}$
- (c) $\frac{3}{10}$
- (d) $\frac{7}{3}$

14 The ratio between the number of electrons of hydrogen atom to the number of electrons of oxygen atom which participate in the formation of single covalent bond in a water molecule

- (a) 1 : 1
- (b) 2 : 1
- (c) 1 : 2
- (d) 8 : 1

15 The following figure illustrates the mechanism of the enzyme action:



What does each of (W), (X) and (Y) represent in this chemical reaction?

	Enzyme	Products	Substrate
(a)	W	X	Y
(b)	X	W	Y
(c)	X	Y	W
(d)	Y	W	X

16 Which of the following organisms has/have breathing openings?

- (a) Dolphins.
- (b) Salmon.
- (c) Icefish.
- (d) Viperfish.

17 The following are statements written by a student about the factors on which the density of a body substance depends:

- (I) The mass of the body.
- (II) The mass of the body molecules.
- (III) The volume of the body.
- (IV) The distances between its molecules (intermolecular spaces).

On which of these factors does the density of a body substance depend?

- (a) (I) and (III).
- (b) (II) and (IV).
- (c) (I) and (IV).
- (d) (II) and (III).

18 The presence of a certain gas in abundance in a planet's atmosphere means that the effective velocity of the molecules of that gas compared to the escape velocity from the planet is

- (a) less (b) equal
(c) slightly greater (d) much greater

19 Which of the following gases, when inhaled, results in the formation of carboxyhaemoglobin in the blood?

- (a) CO_2 (b) NO_2 (c) CO (d) SO_3

20 Which of the following living organisms represent an example for adaptation to low temperatures?

- (a) Wood frog and thorny devil lizard.
(b) Icefish and tilapia.
(c) Wood frog and icefish.
(d) Icefish and thorny devil lizard.

Answer the following questions (21 & 22):

21 What is meant by gas solubility? **Identify** the factors affecting it.

.....
.....

22 Mention a use of ultraviolet rays in:

- (a) The medical field.
(b) The field of counterfeit banknotes.

.....
.....

Exam 8



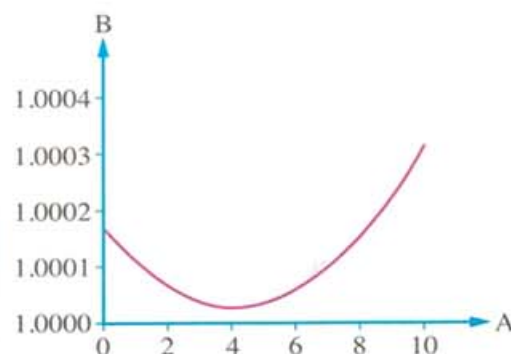
Answered

Choose the correct answer (1 : 20):

1 Which of the following are considered from the major elements in the formation of carbohydrates during the photosynthesis process?

- (a) Glucose and carbon dioxide. (b) Oxygen and glucose.
(c) Carbon dioxide and water. (d) Water and oxygen.

- 2 The opposite graph expresses the relation between two variables (A) and (B) for a transparent liquid that has the ability to dissolve many compounds. Which of the following expresses the variables (A) and (B)?



	Variable (A)	Variable (B)
(a)	Density	Mass
(b)	Density	Volume
(c)	Temperature	Density
(d)	Temperature	Volume

- 3 Increasing urea concentration inside the shark's body acts on

- (a) increasing the osmotic pressure and decreasing water loss
- (b) increasing both the osmotic pressure and water loss
- (c) decreasing both the osmotic pressure and water loss
- (d) decreasing the osmotic pressure and increasing water loss

- 4 A body of mass 2 kg has a temperature of 27°C , and the specific heat capacity of its material is $2 \times 10^3 \text{ J/kg.K}$. If it gains an amount of heat equal to 10^4 J , the temperature of the body will

- (a) increase to 325 K
- (b) increase to 325°C
- (c) increase by 2.5 K
- (d) increase by 5 K

- 5 Which of the two types of the electromagnetic spectrum, infrared rays or visible light, gets completely absorbed by water first?

- (a) Infrared rays.
- (b) Visible light.
- (c) Both are completely absorbed at the same depth.
- (d) Neither is absorbed at all.

- 6 If the depth of the water in a lake is 40 m, then the pressure caused by the water at the bottom is approximately

- (a) 3 times the atmospheric pressure
- (b) 4 times the atmospheric pressure
- (c) 5 times the atmospheric pressure
- (d) 6 times the atmospheric pressure

- 7 Two solutions (X) and (Y) of the same salt, if the freezing point of the solution (X) is lower than the freezing point of the solution (Y), then

- (a) the concentration of salt in solution (X) is higher
- (b) the concentration of salt in solution (Y) is higher
- (c) the concentration of solution (X) is low
- (d) the concentration of the two solutions is equal

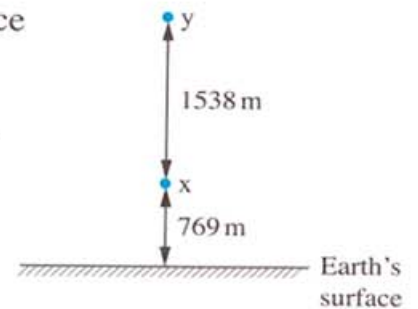
8 Mountain climbers may suffer from bursting of tiny capillaries in the nose due to

- (a) low temperature
- (b) a large difference between the blood pressure inside them and the external atmospheric pressure.
- (c) increased physical activity
- (d) high oxygen levels

9 When the temperature of the environment surrounding warm-blooded organisms changes, their body temperature and from their examples are

- (a) changes - birds
- (b) changes - most fish
- (c) remains constant - birds
- (d) remains constant - most fish

10 In the opposite figure, if the air temperature at the Earth's surface is 20°C , then the ratio between the air temperatures at the two points (y) and (x) on the Celsius scale ($\frac{t_y}{t_x}$) is equal to.....



- (a) $\frac{1}{3}$
- (b) $\frac{1}{4}$
- (c) $\frac{2}{5}$
- (d) $\frac{5}{2}$

11 How is the growth rate of fish affected by an increase in dissolved carbon dioxide in water?

- (a) Increases.
- (b) Decreases.
- (c) Is not affected.
- (d) Stops.

12 The ratio between the molecular mass of water to the molecular mass of hydrogen sulphide is

- (a) greater than 1
- (b) less than 1
- (c) equal to 1
- (d) the answer can't be determined

13 Which of the following leads to coral bleaching?

- (a) Decrease in sea urchin populations.
- (b) Increase in the number of predatory fish.
- (c) Increase in water temperature.
- (d) Increase in the number of symbiotic algae.

14 The large eyes in icefish is considered adaptation.

- (a) behavioral
- (b) functional
- (c) physiological
- (d) structural

15 Which of the following fish has an air bladder? And what is its role?

- (a) Ray fish / Helping in regulating its body temperature.
- (b) Ray fish / Helping in transport between different depths.
- (c) Salmon fish / Helping in regulating its body temperature.
- (d) Salmon fish / Helping in transporting between different depths.

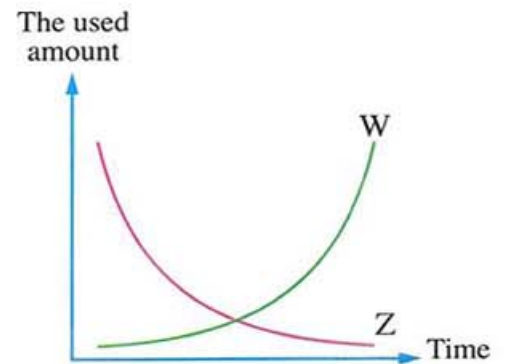
16 Which of the following keeps the internal temperature of the aquatic cold-blooded organisms?

- (a) The high specific heat of water.
- (b) The presence of saturated fatty acids in the cell membranes.
- (c) The presence of single covalent bonds in water molecules.
- (d) The presence of multiple vacuoles in the animal cells.

17 From the examples of greenhouse gases that cause global warming is

- (a) CO
- (b) O₂
- (c) H₂
- (d) N₂O

18 In the opposite graph, curve (W) indicates the amount of solar energy used and curve (Z) indicates the amount of fossil fuel used in a certain region. What conclusion can you deduce from this graph?



- (a) Increasing air pollution.
- (b) Climate change and rising temperature.
- (c) Threat to biodiversity.
- (d) Improve the quality of life.

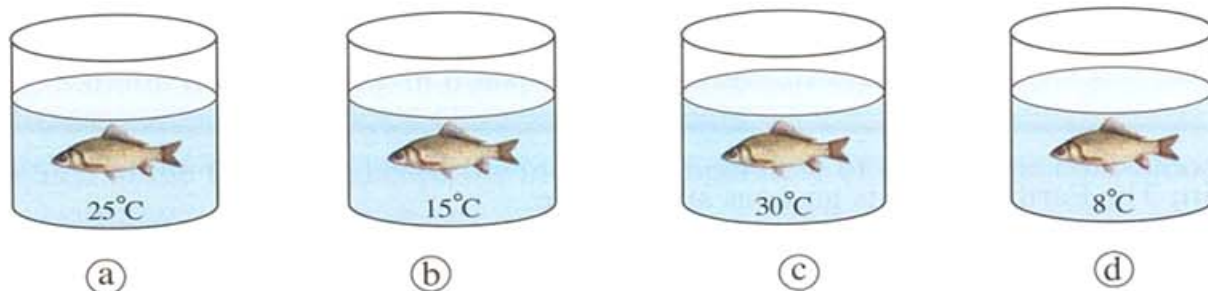
19 You have four living organisms (freshwater algae - shark fish - cactus plant - forest lions), which of the following is applied to these organisms?

- (a) Food chain.
- (b) Food web.
- (c) Living in different ecosystems.
- (d) Living in one environment.

20 Which of the following represents the correct arrangement of the following solutions regarding the pH value?

- (a) Ammonium bicarbonate < Ammonium chloride < Sodium bicarbonate
- (b) Ammonium chloride < Ammonium bicarbonate < Sodium bicarbonate
- (c) Ammonium bicarbonate < Sodium bicarbonate < Ammonium chloride
- (d) Sodium bicarbonate < Ammonium chloride < Ammonium bicarbonate

- 5 The following figures represent four basins containing equal amounts of fresh water at different temperatures. Which of these basins has the least active organism?



- 6 Some marine organisms depend on the deposition of substance to form their shells or bony skeletons.

(a) collagen (b) chitin
(c) calcium carbonate (d) calcium phosphate

- 7 Water can dissolve and hydrolyze the following salts, **except**

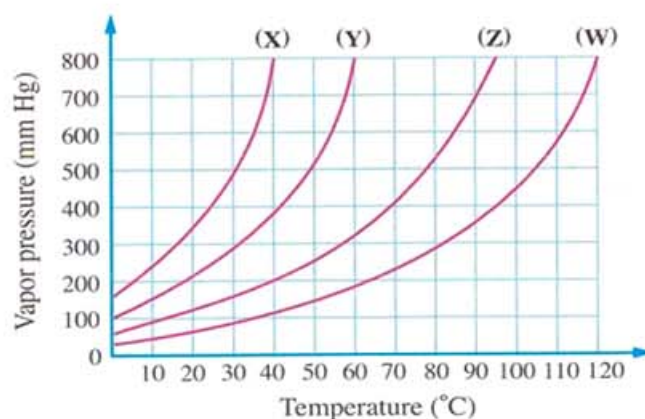
(a) sodium chloride (b) sodium bicarbonate
(c) ammonium bicarbonate (d) ammonium chloride

- 8 A fish at depth 10 m of the water surface whose air bladder volume measured at this depth was 50 cm^3 , then it moved to become at depth 30 m. So, the volume of its air bladder is about

(a) 70 cm^3 (b) 80 cm^3 (c) 50 cm^3 (d) 25 cm^3

- 9 The opposite graph expresses the relation between the vapor pressure of four pure liquids (X), (Y), (Z) and (W) at different temperatures, which liquid whose boiling point is the least at standard atmospheric pressure?

(a) (X).
(b) (Y).
(c) (Z).
(d) (W).



- 10 Which of the following mainly contributes to smog formation in troposphere?

(a) Oxygen in the presence of sunlight. (b) Nitrogen in the absence of sunlight.
(c) Ozone and sulphur dioxide. (d) Argon and fine particles.

- 11 Autotrophic aquatic organisms are found in abundance in
- (a) surface areas, due to the increase in the amount of solar radiation
 - (b) surface areas, due to the decrease in the amount of solar radiation
 - (c) deep areas, due to the increase in the amount of solar radiation
 - (d) deep areas, due to the decrease in the amount of solar radiation

- 12 The opposite figure represents two spheres, one made of iron and the other of aluminum, under the conditions shown in the figure. Which of the following is correct?



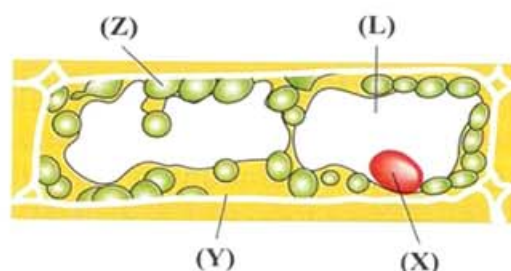
	Direction of heat transfer	Method of heat transfer
(a)	From iron to aluminum	Convection
(b)	From aluminum to iron	Conduction
(c)	From iron to aluminum	Radiation
(d)	From aluminum to iron	Convection

- 13 All of the following pairs of compounds contribute to increasing the temperature of the air adjacent to the Earth's surface, **except**
- (a) CH₄, CO₂
 - (b) CFCs, H₂O
 - (c) NH₃, NO₂
 - (d) N₂O, CH₄

- 14 The force that is exerted by blood during its circulation on unit area of blood vessels walls is called
- (a) systolic pressure
 - (b) diastolic pressure
 - (c) blood pressure
 - (d) blood flow rate

- 15 Which region of the ultraviolet spectrum, when an oxygen molecule absorbs its photons, can break the chemical bond of the molecule?
- (a) Region (UVA).
 - (b) Region (UVB).
 - (c) Region (UVC).
 - (d) The three regions.

- 16 The opposite figure illustrates a cell of a living organism that lives in pond water and fresh swamps. Which of the following indicate(s) that it is a plant cell?
- (a) (Y) only.
 - (b) (Z) only.
 - (c) (X) and (L).
 - (d) (Y) and (L).



- 17** Which of the atmospheric layers is used for wireless communications, and in which of them does the polar aurora phenomenon occur?

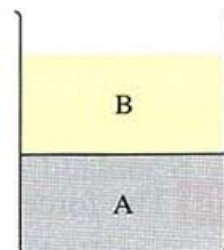
	Wireless communications	Aurora
(a)	Ionosphere	Troposphere
(b)	Exosphere	Stratosphere
(c)	Troposphere	Ionosphere
(d)	Ionosphere	Ionosphere

- 18** Which of the following solutions, when mixed together in equal proportions of volume and concentration, gives a solution with a pH value less than 7?

- (a) Carbonic acid, sodium hydroxide.
- (b) Hydrochloric acid, sodium hydroxide.
- (c) Hydrochloric acid, ammonium hydroxide.
- (d) Ammonium bicarbonate, sodium bicarbonate.

- 19** The opposite figure shows a container with two liquids, (A) and (B). If the volume of liquid (A) is 10 cm^3 and its mass is 12 g, which of the following values could be the density of liquid (B)?

- (a) 0.8 g/cm^3
- (b) 1.8 g/cm^3
- (c) 3.1 g/cm^3
- (d) 13.6 g/cm^3



- 20** Which of the following impacts is considered as a direct result of overfishing of marine animals?

- (a) The increase of predatory fish numbers.
- (b) The imbalance of marine ecosystem.
- (c) The increase of marine biodiversity.
- (d) Enhancement of the quality of water, due to the reduction of fish numbers.

Answer the following questions (21 & 22):

- 21** Calculate the amount of heat energy required to raise the temperature of 50 g of copper from 20°C to 80°C .

(Given that: The specific heat of copper = 385 J/kg.K)

.....

.....

22 Identify:

- (a) Type of adaptation in salmon migration.
 (b) Functional suitability of the contractile vacuole in *Amoeba*.
-
-

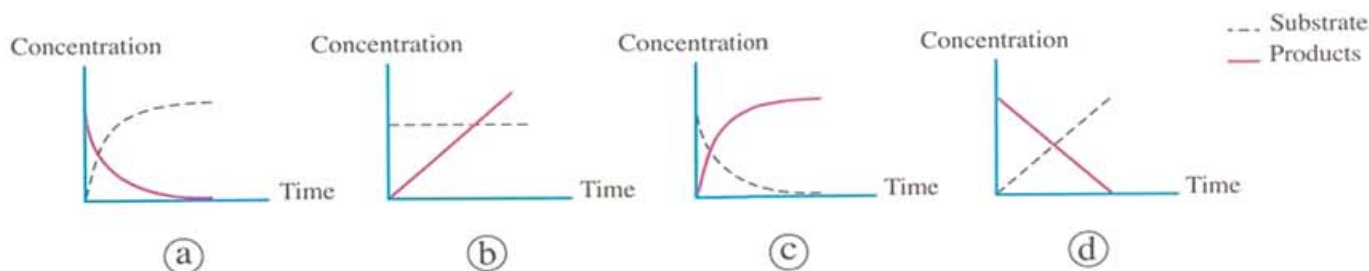
Exam 10 ? Answered**Choose the correct answer (1 : 20):**

- 1** If the amount of dissolved oxygen in one liter of river water at a temperature of 20°C is about 10 mg, what is its potential amount in one liter of ocean water at the same temperature?
 (a) 7.5 mg (b) 12 mg (c) 15 mg (d) 10 mg
- 2** The higher we move up to the surface of the sea compared to the sea floor, then

	Pressure at a point	The percentage of dissolved oxygen
(a)	Increases	Increases
(b)	Decreases	Increases
(c)	Increases	Decreases
(d)	Decreases	Decreases

- 3** The ratio of the altitude at which an airplane is flying and experiencing an atmospheric pressure of 110 millibars to the altitude at which an airplane is flying and experiencing an atmospheric pressure of 80 millibars is
 (a) greater than one (b) less than one
 (c) equal to one (d) cannot be determined
- 4** The environment is a whole system that consists of elements.
 (a) physical only (b) chemical only
 (c) chemical and biological (d) physical, chemical, and biological
- 5** The compressed body of the icfish body is considered adaptation.
 (a) physiological (b) structural (c) behavioral (d) functional

- 6 From the following graphs, which relation shows the change in the concentration of substrate with the quantity of products over time of the reaction in optimum conditions?



- 7 Which of the following gases causes corrosion of plastic and rubber?
 (a) Argon. (b) Nitrogen. (c) Oxygen. (d) Ozone.

- 8 Viperfish adapts with low levels of oxygen in depths by

- (a) the presence of high levels of haemoglobin in its blood
 (b) the presence of flexible bony skeleton
 (c) the increase of metabolic rate
 (d) the presence of strong arteries and veins

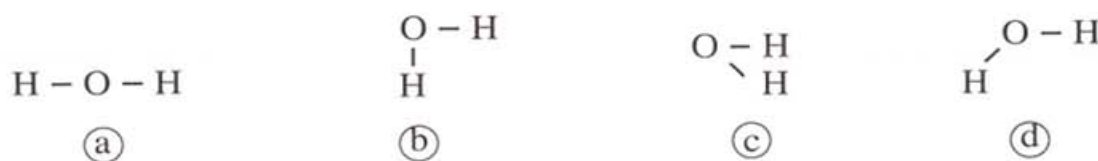
- 9 Which of the following wavelengths of ultraviolet rays causes the breaking of the covalent bond in an oxygen molecule upon absorption?

- (a) 200 nm (b) 300 nm (c) 350 nm (d) 550 nm

- 10 If we assume that gas (X) is one of the main gases in the planet Earth's atmosphere, which of the following can represent the value of effective velocity (v_{rms}) for this gas?

- (a) 11.2 km/s (b) 12.2 km/s (c) 9.2 km/s (d) 19.2 km/s

- 11 Which of the following figures correctly expresses the structure of water molecule and the angle between the two covalent bonds?



- 12 Which of the following has an important role in energy production in the form of ATP molecules?

- (a) Nitrogen. (b) Carbon. (c) Calcium. (d) Oxygen.

- 13 Which of the following is **not** from the functions of satellites?

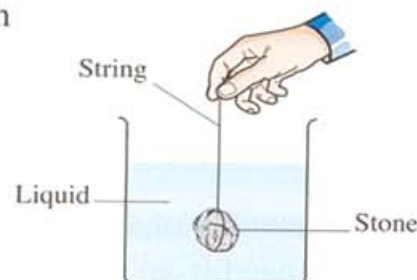
- (a) Removing sulphur oxides from the atmospheric air.
 (b) Measuring the concentration of gases responsible for global warming.
 (c) Continuously monitoring the state of the ozone layer.
 (d) Providing meteorologists with data on cloud movement.

14 When a quantity of table salt is dissolved in distilled water, what happens to the vapor pressure of the liquid?

- (a) It decreases.
- (b) It increases.
- (c) It doubles.
- (d) It is not affected.

15 The opposite figure shows a stone submerged at a certain depth beneath the surface of a liquid, so that the lower surface of stone experiences a certain pressure, so what can reduce the pressure on the stone?

- (a) Dissolving salt in water.
- (b) Raising the stone up slightly.
- (c) Dropping the stone to the bottom of the container.
- (d) Moving the stone horizontally at the same depth.



16 A quantity of pure water has a volume of 20 cm^3 at a temperature of 4°C , so what is its mass?

- (a) 10 g
- (b) 20 g
- (c) 100 g
- (d) 200 g

17 Which of the following is from the direct results for increasing the concentration of fertilizers in agricultural drainage water?

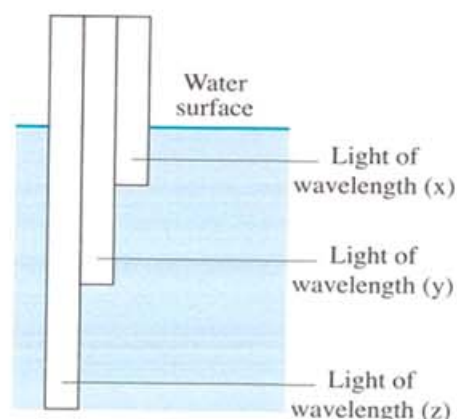
- (a) Abnormal algal blooming.
- (b) Flourishing of fisheries.
- (c) Excessively decrease in nutrients.
- (d) Inhibition of algae growth.

18 The ratio between the number of hydroxide ions in ammonium chloride solution to their number in ammonium bicarbonate solution is

- (a) less than 1
- (b) greater than 1
- (c) equal to 1
- (d) cannot be determined

19 The opposite figure represents three beams of visible light with wavelengths (x), (y), and (z) passing through ocean water, so the correct arrangement of these wavelengths is

- (a) $x > y > z$
- (b) $z > y > x$
- (c) $x = y = z$
- (d) $z > x > y$



20 Which of the following is **not** considered a biological importance for forecasting potential climate changes?

- (a) Protecting humans from respiratory diseases.
- (b) Protecting sensitive organisms.
- (c) Choosing appropriate planting dates.
- (d) Changing rainfall patterns.

Answer the following questions (21 & 22):

21 A quantity of water with a mass of 100 g gained 25.2 kJ of heat, so that its temperature changed from 40°C to 100°C, then the water gained 226 kJ of heat to turn into water vapor at 100°C, **calculate:**

- (a) The specific heat capacity of water.
- (b) The latent heat of vaporization for water.

.....

.....

22 Explain: The wood frog produces large amounts of glucose in its vital organs at the beginning of winter.

.....

.....

Answers of General Exams ✓

Answers of Exam 1

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	a	b	d	c	b	d	b	d	b	d

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	a	a	b	d	d	b	a	a	a	d

21 & 22 Answer by yourself.

Answers of Exam 2

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	c	d	c	c	a	c	b	b	d	d

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	b	c	a	c	c	b	b	c	c

21 : 23 Answer by yourself.

Answers of Exam 3

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	a	a	a	a	b	c	d	c	d	b

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	c	a	b	c	b	b	a	a	b	b

21 & 22 Answer by yourself.

Answers of Exam 4

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	a	a	d	c	b	c	d	c	c	a

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	b	a	a	c	a	b	a	d	c

21 : 23 Answer by yourself.

Answers of Exam 5

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	a	b	d	b	c	d	d	b	d

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	a	b	c	b	a	b	c	b	c

21 & 22 Answer by yourself.

Answers of Exam 6

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	a	a	c	a	c	a	c	b	d	c

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	c	c	c	d	b	c	a	b	c	b

21 & 22 Answer by yourself.

Answers of Exam 7

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	d	c	b	c	a	b	c	a	c	a

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	d	a	d	a	c	a	b	a	c	c

21 & 22 Answer by yourself.

Answers of Exam 8

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	c	d	a	c	a	b	a	b	c	a

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	b	c	d	d	a	d	d	c	b

21 & 22 Answer by yourself.

Answers of Exam 9

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	d	b	d	c	c	c	a	d	a	c

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	a	b	c	c	c	d	d	c	a	b

21 & 22 Answer by yourself.

Answers of Exam 10

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	a	b	b	d	b	c	d	a	a	c

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	d	d	a	a	b	b	a	a	a	d

21 & 22 Answer by yourself.

حمل الآن

مجاناً وحصرياً

المراجعة رقم (3)

الترم الاول



Question 1: Choose the correct answer from the following:

**Chapter 1:
Lesson 1:**

1. Which of the following doesn't represent an ecosystem?

- a) The great desert. c) Atmosphere. b) Amazon rainforest d) Salty lakes

2. All the following from the abiotic factors in an environment EXCEPT.....

- a) Air b) Water c) Soil d) Human

3. It is where living organisms are found on, above, and below the Earth's surface.

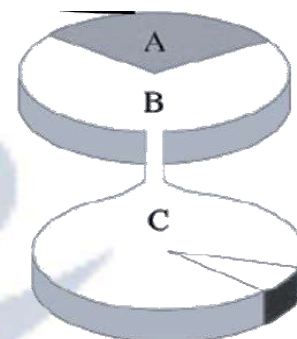
- a) Lithosphere b) Biosphere c) Atmosphere d) Hydrosphere

4. It is a blanket of gases that surrounds Earth. It is held near the surface of the planet by Earth's gravitational attraction.

- a) Lithosphere b) Biosphere c) Atmosphere d) Hydrosphere

5. The figure shows the percentage of the distribution of lithosphere and hydrosphere on Earth. Which of the following is correct?

	A	B	C
A	Lithosphere	Hydrosphere	Fresh water
B	Lithosphere	Fresh water	Salt water
C	Fresh water	Lithosphere	Salt water
D	Lithosphere	Hydrosphere	Salt water



6. Water covers about from Earth 's surface.

- A. 50 % B. 60 % C. 70 % D. 80

7. The percentage of fresh liquid water is about from all water shapes on Earth.

- A. 1 % B. 30 % C. 70 % D. 97 %

8. Which of the following represents the greatest source of water on Earth's surface?

- (a) Oceans (b) ground water (c) Fresh lakes (d) Frozen rivers

9. The ratio between: The fresh liquid water and the frozen fresh water on Earth is equal to.....

- (a) 1\2 (b) 2\1 (c) 3\1 (d) 1\1

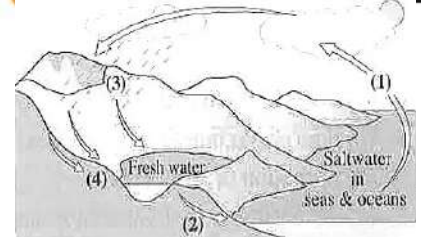
10. Which of the following is not related to the hydrological cycle in nature?

- (a) water movement through many pathways (c) keeping the stability of Earth's surface
(b) living organisms have essential role in it (d) is nearly a close system

11. The opposite figure illustrates some processes in the water cycle in nature:

(a) Which of the following processes directly precedes the condensation process?

- a) 1 b) 2 c) 3 d) 4



b) Which of the following processes doesn't occur by the effect of gravity?

- a) 1 b) 2 c) 3 d) 4

12. Which of the following processes, if stopped, would directly disrupt the water cycle on the Earth's surface and in the atmosphere?

- (a) Surface runoff (b) Evaporation (c) Soil infiltration (d) Transpiration

13. Which of the following processes may be a direct source of groundwater?

- a) Water evaporation. b) Respiration in human c) Transpiration in plants d) infiltration

14. How does water return directly from land to oceans?

- a. By evaporation b. By flowing c. by condensation d. by volatility

15. What is the process that occurs to the output of (a consequence for) transpiration during the hydrological cycle?

- a. evaporation . b. condensation . c falling. d. infiltration

16. Stomata are present in.....

- a. roots. b. leaves c. flowers. d. fruits

17. An increase in the rate of transpiration indirectly affects the water cycle in nature through

- (a) Reducing rainfall (c) Reducing the rate of evaporation from water surfaces
(b) Fixing CO₂ in leaves (d) Increasing water vapor in the atmosphere

18. From the importance of the transpiration for the plants:

- a) increasing the temperature of the plants
(b) increasing the percentage of CO₂
(c) helping in rising salts and water to upper parts .
(d) decreasing the ability of the plants in rising salts and water to upper parts .

19. Which of the following is not from the nitrogenous wastes?

- (a) Ammonia (b) Nitrogen gas (c) Urea (d) Uric acid

20. Which of the following processes doesn't result in increasing the percentage of water vapor in the atmosphere?

- a) A transpiration in plants. b) Animals respiration.
a) Water infiltration through sedimentary rocks. c) Seawater evaporation

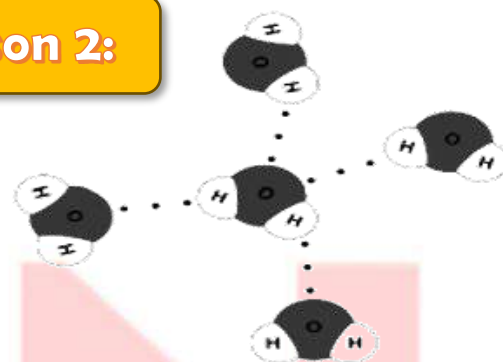
21. Which of the following factors doesn't affect the transpiration process?

- a) Number of plant leaves. c) Number of flowers and fruits.
b) Soil humidity. d) Atmospheric temperature

22. In which of the following periods of time, the rate of transpiration increase during the day?

- a) At early morning. b) At noon. c) At sunset. d) At evening

Lesson 2:



23. In the opposite figure what is the type of bond?

choice	In the water molecule	between water molecules
A	Covalent	Hydrogen
B	Covalent	Covalent
C	Hydrogen	Covalent
D	Hydrogen	Hydrogen

24. Which of the following expressions is correct in a water molecule?

- A. the percentage of Hydrogen mass is 66.67% C. the percentage of Hydrogen mass is 11.11%
B. the percentage of Oxygen mass is 33.33% D. the percentage of Oxygen mass is 66.67%

25. What is the mass ratio of hydrogen to oxygen, respectively, in a water molecule?

- a) 1\8 b) 1\9 c) 2\1 d) 8\9

26. All of the following are consequences of the polarity of the water molecule except:

- A. Water molecules are linked together by hydrogen bonds.
B. The ability to dissolve many mineral salts.
C. The boiling point of water rises to 100 C
D. The ability to dissolve a non-polar organic compound.

27. The hydrolysis of ammonium chloride:

	Hydrogen ions concentration	Hydroxyl ions concentration	The relation between (H^+) , (OH^-)	pH	The acid type	The base type
A	decreases	decreases	$[H^+] < [OH^-]$	More 7	weak	weak
B	doesn't change	doesn't change	$[H^+] = [OH^-]$	Equal to 7	strong	strong
C	increases	decreases	$[H^+] > [OH^-]$	Less 7	strong	weak
D	decreases	increases	$[H^+] < [OH^-]$	More 7	weak	strong

28. The hydrolysis of ammonium bicarbonate:

	Hydrogen ions concentration	Hydroxide ions concentration	The relation between (H^+) , (OH^-)	pH	The acid type	The base type
A	decreases	decreases	$[H^+] < [OH^-]$	More 7	weak	weak
B	doesn't change	doesn't change	$[H^+] = [OH^-]$	Equal to 7	weak	weak
C	increases	decreases	$[H^+] > [OH^-]$	Less 7	strong	weak
D	decreases	increases	$[H^+] < [OH^-]$	More 7	weak	strong

29. The following chemical equation represents the hydrolysis of the salt (WZ):



Which of the following represents the pH value of the solution?

- A. 8 B. 7 C. 6 D. 5

30. Which of the following is not from the properties of water that support life?

- a) Dissolving many chemical compounds. c) Passing the waste to outside the cell.
b) Passing required substances to inside the cell. d) The difference in the mass of its elements

31. Water resembles hydrogen sulfide in.....

- a) molecular mas. c) the boiling point
b) the presence of hydrogen bonds d) the molecular structure

32. At normal atmospheric pressure, the boiling point of pure water (H_2O) is greater than that of hydrogen sulfide (H_2S) by

- a) $100^{\circ}C$ b) $-61^{\circ}C$ c) $39^{\circ}C$ d) $161^{\circ}C$

33. Which of the following solutions has the highest pH value?

- a) Ammonium bicarbonate solution. c) Acetic acid solution.
b) Potassium bicarbonate solution. d) Nitric acid solution

34. The ratio between (H^+) ions concentration in an acidic solution to their concentration in an alkaline solution is.....

- a) greater than 1 b) equals 1 c) less than 1 d) equals 7

35. On diluting a concentrated hydrochloric acid HCl , the pH value increases as a result of

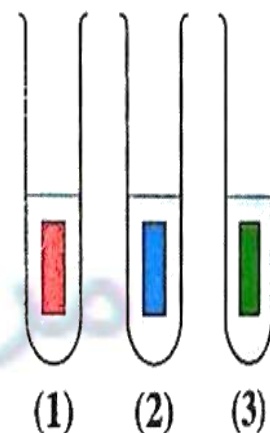
- a) increasing the concentration of Cl^- ions c) increasing the concentration of H^+ ions
b) decreasing the concentration of Cl^- ions d) decreasing the concentration of H^+ ions

36. The patient who suffers from severe stomach acid secretion (stomach acid reflux) is advised to.....

- a) Use a suitable treatment that decreases the pH value
b) Use a suitable treatment that increases the pH value
c) Eat food that increases the (H^+) ion concentration
d) Drink soda that contains a percentage of CO_2

37. Three pH test strips were immersed in three solutions (1), (2) and (3), as in the opposite figure. Which of the following choices is correct?

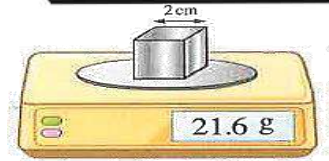
	Solution (1)	Solution (2)	Solution (3)
a)	Ammonium chloride	Sodium bicarbonate	Sodium chloride
b)	Sodium chloride	Ammonium chloride	Sodium bicarbonate
c)	Sodium bicarbonate	Sodium chloride	Ammonium chloride
d)	Sodium chloride	Sodium bicarbonate	Ammonium chloride



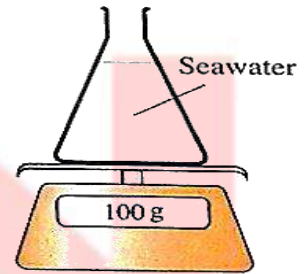
Lesson 3:

38. The density of water is equal to $1g/cm^3$ at a temperature $4^{\circ}C$, then the mass of $4 m^3$ of water is equal

- A. 0.004 kg B. 1 kg C. 4 kg D. 4000 kg



d) 10800 kg/m^3



39. The opposite figure shows a solid cube with a side length of 2 cm. When placed on a balance, the balance reading was 21.6 g, so the density of the cube material is.....

a) 2700 kg/m^3 b) 3600 kg/m^3 c) 5400 kg/m^3

40. A flask containing a sample of seawater was placed on the pan of a balance. The reading of the balance for the water and the flask together was 100 g, as shown in the figure. Knowing that the density of seawater is 1030 kg/m^3 , what is the volume of the sample?

a) Greater than 97 cm^3 c) Less than 97 cm^3
b) Equal to 97 cm^3 d) Cannot be determined

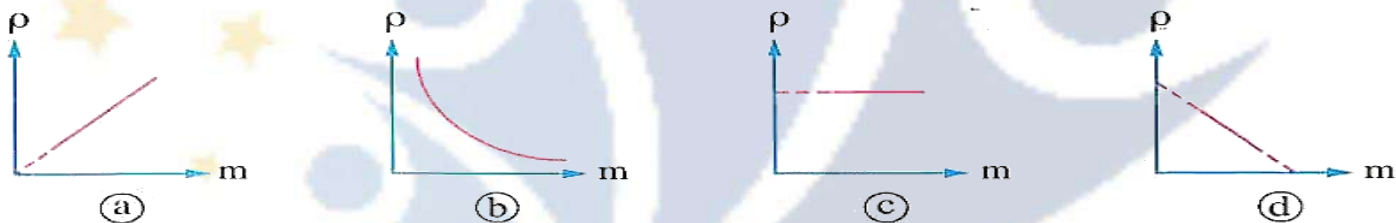
41. Two solid cylinders are made of the same metal and have the same diameter, one of them is longer than the other at the same temperature, so both cylinders have the same.....

a) mass b) density c) volume d) weight

42. Liquid at a specific temperature was poured into a cylindrical container until its level reached the middle of the container. The density of the liquid was (ρ), if more of the same liquid is poured at the same temperature to completely fill the container, the density of the liquid will be equal to.....

a) $1/2 \rho$ b) 2ρ c) $3/2 \rho$ d) ρ

43. The graph that represents the relationship between the density (ρ) of pure water and the mass (m) of samples from it at a temperature of 50°C is.....



44. The maximum density of pure water at a temperature of

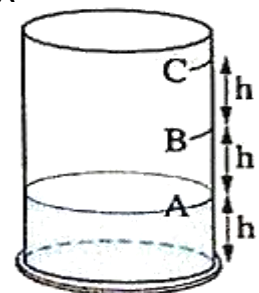
a) 0°C b) 4 K c) 90°C d) 277 K

45. The figure shows three cups of water of different salinities, at the same temperature. An egg is placed in each of them (and the eggs are completely identical). The arrangement of the water according to density is:



A. $X = Y = Z$ B. $X > Y > Z$ C. $Z > Y > X$ D. $Z > Y = X$

46. The opposite figure shows a container containing an amount of liquid. If an amount of liquid Y of relative density 1 is added to the container with a mass m and does not mix with the first liquid, the surface level of liquid Y will settle.....



a) at level B c) between levels A and B
b) at level C d) between levels B and C

- 47.** The relative density of seawater is 1.025, this means that the density of seawater is equal to:

	In g/cm^3	In kg/m^3
A	1.025	1.025
B	1025	1025
C	1.025	1025
D	1025	1.025

- 48.** Given that the relative density of mercury is higher than the relative density of alcohol at the same temperature, then the ratio of the mass of 1 cm^3 of mercury to the mass of the same volume of alcohol is

a) greater than 1 b) less than 1 c) equal to 1 d) indeterminable

- 49.** The density of water is equal to 1 g/cm^3 at temperature 4°C , when the temperature is raised to 8°C the:

	The water volume	The water density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

- 50.** Four samples of water each have a mass of 1 Kg, which one has a larger volume:

A. Saltwater at 4°C B. Saltwater at 8°C C. Fresh water at 4°C D. Fresh water at 8°C

- 51.** Which of the following devices is used to measure the density of liquids?

A. Hydrometer B. Barometer C. Manometer D. Thermometer

- 52.** In the hydrometer scale:

A. The lower scale indicates zero density C. The lower scale indicates the lowest density
B. The upper scale indicates zero D. The upper scale indicates the lowest density

- 53.** In a hydrometer, which of the following materials can be used to help balance:

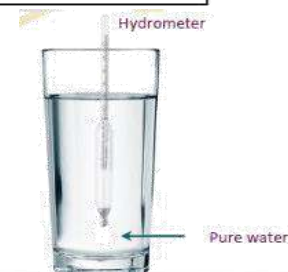
A. Mercury or lead balls. B. Nickel or chromium. C. Platinum or iridium. d. Bronze or phosphorus.

- 54.** In the hydrometer:

	The function of wide cavity	The function of mercury
A	Floating	vertical balance
B	Floating	Floating
C	vertical balance	Floating
D	vertical balance	vertical balance

- 55.** In the diagram shown, when a large amount of salt is dissolved in the pure water; the volume of the immersed part of the hydrometer in the water.....

A. increases B. decreases C. doesn't change D. cannot be determined



56. Both volume of water and density of water change with temperature What happens during each procedure described below?

0 °C ← 4 °C 4 °C ← 23 °C

	The water volume	The water density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

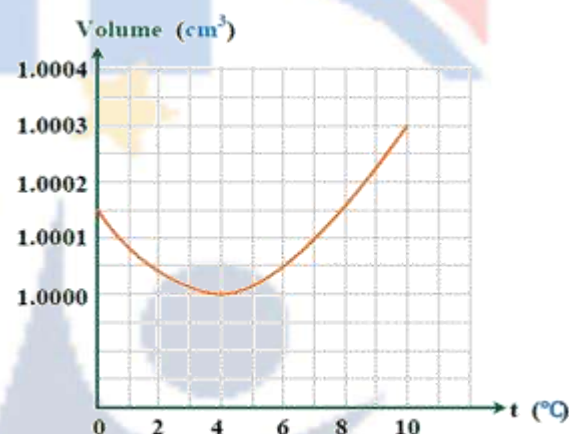
	The water volume	The water density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

0 °C → 8 °C

	The water volume	The water density
A	increases	decreases
B	decreases	increases
C	decreases then increases	increases then decreases
D	increases then decreases	decreases then increases

57. From the graph shown, we can conclude that:

- A. The density of water increases when the temperature is raised above 4 °C
- B. The density of water increases when the temperature is lowered below 4 °C
- C. The volume of water increases when the temperature is lowered below 4 °C
- D. The volume of water decreases when the temperature is lowered below 4 °C



58. Ocean currents transport:

- A. Heat from the poles to the tropics.
- B. Salt from the poles to the tropics
- C. Nutrients from the ocean bottom to the surface.
- D. Nutrients from the ocean surface to the bottom.

59. The direction in which ocean currents move.....

	Heat and salts	Nutrients
A	From the poles to the equator	From the ocean surface to the bottom
B	From the poles to the equator	From the bottom of the ocean to the surface
C	From the equator to the poles	From the bottom of the ocean to the surface
D	From the equator to the poles	From the ocean surface to the bottom

60. In ocean depths, where pressure is very high, how does the enormous increase in pressure affect the density of water in large depths compared to its density at the surface?

- a) The increase in pressure has no effect on density because water is completely incompressible.
- b) The density increases, but this effect is completely overcome by the decrease in temperature at the bottom.
- c) The density decreases because the high pressure breaks the hydrogen bonds.
- d) Density increases slightly due to the compression of water under pressure.

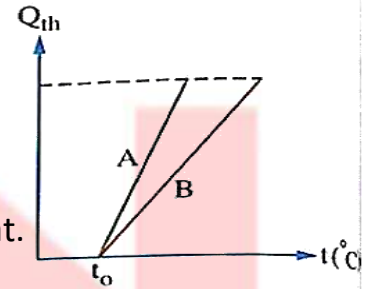
- 61.** When the melting glaciers enter the ocean water, they.....
 a) mix because each is a liquid, water, with the same density.
 b) Don't mix, and the salty water floats on the surface of the fresh water.
 c) Don't mix, and the fresh water floats on the surface of the salty water.
 d) mix because they are two liquids with different densities
- 62.** What is the fundamental relationship between increasing salinity and the density of liquid water at constant temperature and pressure?
 (a) The density increases because adding salts increases the total mass per unit Volume.
 (b) The density increases because the specific heat of the solution decreases.
 (C) The density decreases as the dissolved ions between water molecules increase volume.
 (d) The density remains constant because the mass of dissolved salts are compensated by a similar decrease in the volume of water.
- 63.** Which pair of the following physical quantities have the same unit of measurement?
 a) Amount of heat and temperature. c) Amount of heat and internal energy.
 b) Specific heat and temperature. d) Internal energy and temperature
- 64.** Which of the following statements most accurately represents the definition of heat (Q) accurately?
 (a) The transfer of energy across a system boundary due to a temperature difference.
 (b) The state of matter from hotness and coldness.
 (C) The average latent energy stored in the molecular bonds of a substance.
 (d) The total thermal energy contained within a system's boundaries.
- 65.** The average of kinetic energy of water molecules is the largest at
 a) Zero °C b) 50 °C c) 80 °C d) 100 °C
- 66.** The system international measuring unit of temperature is
 A. degree Celsius (°C) B. degree Fahrenheit (°F) C. Kelvin (K) D. Rankine (°R)
- 67.** The freezing point of pure water is
 a) -273 k b) 273 °C c) 0 k d) 273 k
- 68.** The absolute zero is equal to.....
 a) 0 k b) 273 K c) 0 °C d) 273 °C
- 69.** Two equal masses from different metals (A) and (B) are heated by the same amount of heat; the temperature of (A) increased by 50°C while the temperature of metal (B) increased by 150°C. If the specific heat of (A) = 390 J/kg. °C, then the specific heat of (B) =.....
 (a) 130 J/kg. °C (b) 260 J/kg. °C (C) 390 J/kg. °C (d) 520 J/kg. °C
- 70.** If you know that the specific heat of glass is 840J/ Kg.°C, it is equivalent to
 a) 3.08 J/Kg.K b) 567 J/Kg.K c) 840 J/Kg.K d) 1113 J/Kg.K

71. Which of the following affects the specific heat of the substance?

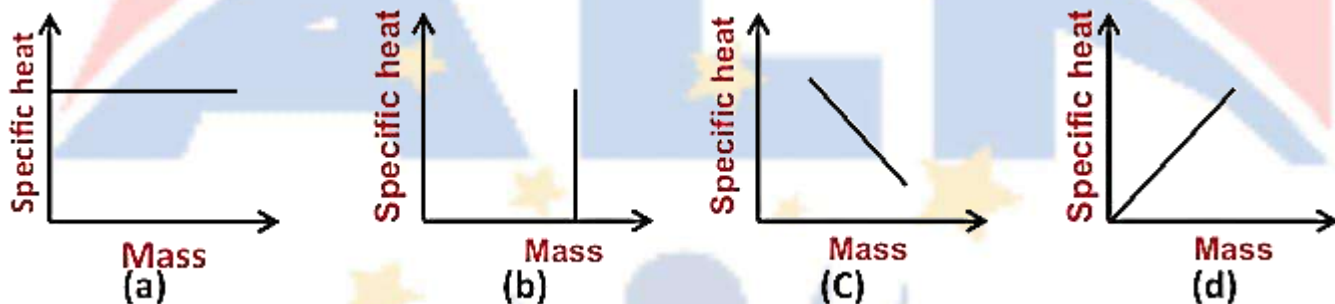
- (a) Its physical state (c) Its volume
(b) Its mass (d) Quantity of heat lost or gained

72. Two quantities of two liquids A and B with the same mass were heated from a temperature t_0 and the opposite graph represents the relationship between the amount of heat (Q) absorbed by each liquid and its temperature (t), so which liquid has a higher specific heat?

- a) Liquid A. c) The two liquids have the same specific heat.
b) Liquid B. d) The answer cannot be determined



73. Which of the following graphs represents the correct relation between mass of substance and its specific heat.....



74. Two solid bodies, (1) and (2), made of the same material with masses m_1 and m_2 , respectively, if each of them has absorbed an amount of heat Q so that their temperatures have increased by 5°C and 10°C respectively, the ratio of their masses $m_1 \setminus m_2$ is

- a) $1 \setminus 2$ b) $1 \setminus 1$ c) $2 \setminus 1$ d) $4 \setminus 1$

75. The following data table shows the change in temperature of equal masses of different materials (Δt) when each one gains the same amount of heat.

Substance	The change in its temperature at gaining the same amount of heat
W	5°C
X	10°C
Y	15°C
Z	20°C

Which substance W, X, Y or Z has the largest specific heat?

- a) Substance W b) Substance X c) Substance Y d) Substance

76. Which causes more severe skin burns, being exposed to water vapor of 100°C or being exposed to liquid water at the same temperature? (Where: the skin is exposed to the same amount of water and water vapor for the same interval of time).

- a) Liquid water due to its high specific heat.
b) Liquid water due to the high amount of heat it emits during boiling.
c) Water vapor due to its low specific heat.
d) Water vapor due to the high amount of heat it emits at condensation

77. Two equal masses of liquids (a) and (b) of specific heat capacities c_a and c_b respectively, are miscible but don't react together. The temperatures of the two liquids were 80°C and 10°C , respectively. If the two liquids are mixed to reach thermal equilibrium at a final temperature of 30°C , the ratio (c_a/c_b) is equal.....

- a) $1/3$ b) $3/1$ c) $2/5$ d) $5/2$

78. An insulated aluminum container of mass 20 g contains 150 g of water at a temperature of 20°C . A piece of a metal of mass 96 g and temperature 100°C is dropped into water. If the final temperature of the system is 25°C and the specific heat capacities of water and aluminum are 4200 J/kg.K and 900 J/kg.K , respectively, then the specific heat capacity of the metal of the dropped piece equals.....

- (a) 450 J/kg. K (b) 710 J/kg. K (C) 960 J/kg. K (d) 1440 J/kg. K

79. Which group of organisms listed below are Poikilotherms (cold-blooded)?

- (a) Birds and Mammals. (C) Humans and Whales.
(b) Fish, Amphibians, and Reptiles. (d) Only Arthropods.

80. The concept "latent" refers to

- (a) The heat is only absorbed when the substance is impure.
(b) The heat is hidden because it causes a significant change in pressure.
(C) The heat is absorbed or released without a change in temperature ($\Delta T=0$).
(d) The heat can only be measured using an indirect method

Lesson 4:

81. Colligative properties of a solution...

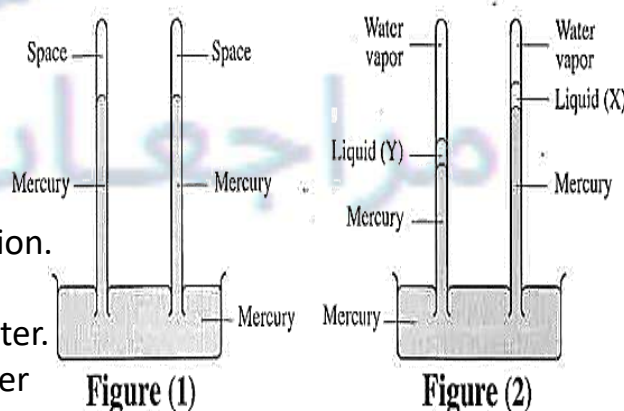
- a) Depend only on the type of solute. c) Depend on the type and concentration of the solute.
b) Depend only on the type of solvent. d) Depend on the concentration of solute, not its type.

82. What does the term " the concentration of solution " express?

- a) Total volume of solution c) Amount of solute in a given volume of solvent
b) Type of solute and solvent d) Temperature of the solution

83. In the two opposite figures, two equal volumes of liquids (X) and (Y) were put in the two tubes of the apparatus illustrated in figure (1) each separately. So, the mercury level in the two tubes decreases as in figure (2), which of the following is correct?

- a) (X) represents distilled water / (Y) represents NaCl solution.
b) represents river water / (Y) represents seawater.
c) (X) represents NaCl solution / (Y) represents distilled water.
d) (X) represents distilled water / (Y) represents ocean water



84. What is the relationship between the number of solute molecules in a solution and its vapor pressure?

- A) Inverse relationship. C) No relationship.
B) Direct relationship. D) Variable relationship.

85. Why are water molecules less likely to evaporate in solutions than in pure water?

- A) Because of the attractive forces between water molecules increases
- B) Because of the attractive forces between water molecules decreases
- C) Because of the attractive forces between water molecules and the solute increases
- D) Because of the attractive forces between water molecules and the solute decreases

86. Which of the following factors doesn't affect the boiling point of solution?

- a. Volume of solution
- b. Density of solution
- c. Atmospheric pressure
- d. Concentration of solution

87. When a water sample is left exposed to the atmospheric air, then part of water is evaporated, so its boiling point

- A- decreases
- B- becomes zero
- C- increases
- D- does not change

88. What is the effect of increasing the number of solute molecules in solution on the boiling point of the solution and its density?.

	On the boiling point	On the density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

89. When comparing between two equal concentrations of $\text{Al}_2(\text{SO}_4)_3$ and $\text{Al}(\text{NO}_3)_3$ solutions, the boiling point and vapor pressure of aluminum sulphate solution according to aluminum nitrate solution are and..... respectively.

- a) lower - higher
- b) higher - lower
- c) higher - higher
- d) lower - lower

90. On measuring the boiling point of three identical samples of table salt solution:

T 1	Represents the boiling point of the solution at standard atmospheric pressure.
T 2	Represents the boiling point of the solution at the top of a high mountain.
T 3	Represents the boiling point of the solution inside a pressure cooking pot

Which of the following relations is correct?

- a) $T_1 > T_2 > T_3$
- b) $T_3 > T_2 > T_1$
- c) $T_2 > T_1 > T_3$
- d) $T_3 > T_1 > T_2$

91. The decrease in freezing point isproportional to number of solute particles, while increase in boiling point is proportional to solution concentration.

- A- direct / direct
- B- direct /inversely
- C- inversely / inversely
- D- inversely / direct

92. Three aqueous solutions of equal volume X, Y, and Z, each containing different amounts of sodium chloride, as shown in the opposite table. The correct order of the freezing points of T_x , T_y , and T_z is

Solution	The amount of dissolved table salt
X	50 g
Y	10 g
Z	80 g

- a) $T_x > T_y > T_z$
- b) $T_x = T_y = T_z$
- c) $T_y > T_x > T_z$
- d) $T_y < T_x < T_z$

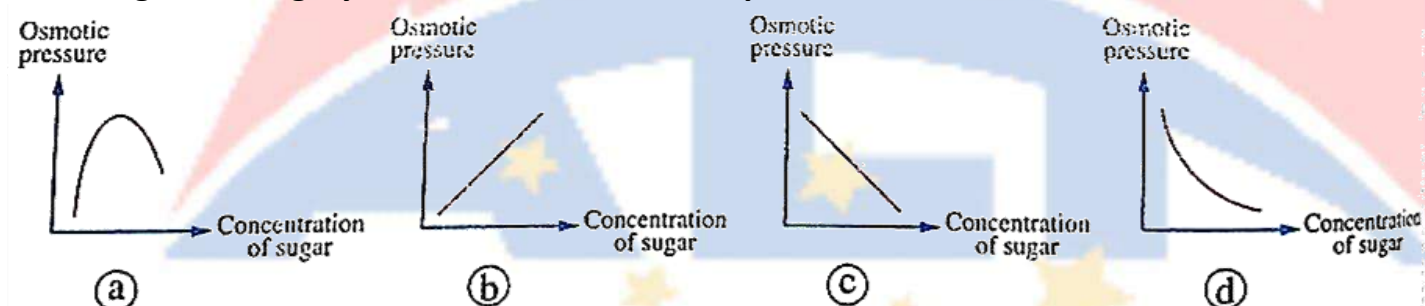
93. On adding 50 mL pure water to 100 mL salt solution, then

- a) The boiling point of the solution decreases and its vapor pressure decreases
- b) The freezing point of the solution decreases and its boiling point increases
- c) The vapor pressure of the solution increases and its osmotic pressure increases.
- d) The freezing point of the solution increases and its vapor pressure increases

94. As the freezing point of a solution increases, its osmotic pressure...

- A- increases
- B- decreases
- C- does not change
- D- becomes zero

95. Which of the following graphs illustrates the relationship between the concentration of sugar in a sugary solution and its osmotic pressure?



96. Which of the following represents a correct arrangement for the osmotic pressure of three water samples from different sources at 25°C?

- a) Fresh water > Distilled water > Salt water.
- b) Fresh water = Distilled water > Salt water.
- c) Salt water > Fresh water > Distilled water.
- d) Salt water > Fresh water = Distilled water

97. Two liquids X and Y are separated by a semipermeable membrane. If the boiling point of X > boiling point of Y, then water...

- a) moves from liquid X to liquid Y.
- b) remains stationary in both liquids.
- c) moves from liquid Y to liquid X.
- d) moves between both liquids at the same rate

Lesson 5:

98. All the following from the reasons that make "water is essential for life" except.....

- a) The vital activities in all living cells depend on the water properties.
- b) It is the most abundant chemical substance in living organisms.
- c) It is present in almost all chemical reactions occurring in vital activities.
- d) Water is found inside the cells only.

99. Which of the following correctly describe eukaryotes?

- a) They are unicellular organisms only
- b) Their cell contains a nucleus surrounded by a membrane, and specialized organelles
- c) Their genetic material is not surrounded by a nuclear membrane
- d) They are multicellular organisms only

100. From your study of prokaryotes and eukaryotes, determine: Which of the following is present in all prokaryotes and all eukaryotes?

- a) Cellulose
- b) Nucleus
- c) Genetic material
- d) Plastids

Fifth: Which organelles that are a group of membranes used to transport various materials from one place to another inside the cell.?

- a) Organelle W b) Organelle X c) Organelle Y d) Organelle

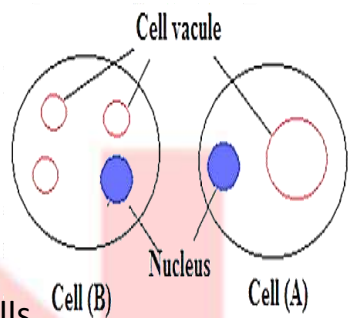
109. Plants differ from animals in all of the following except...

- a) The ability to move c) Multicellular
b) Type of nutrition d) The presence of cellulose

110. The figure represents two cells (A) and (B). Study it and then answer:

Which of the following is true regarding the types of cells?

- A. Cell (A) is animal, while cell (B) is plant. C. Both (A) and (B) are animal cells.
B. Cell (A) is plant, while cell (B) is animal. D. Both (A) and (B) are plant cells.



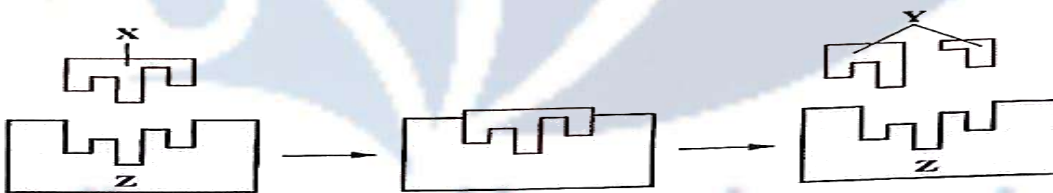
111. Which of the following correctly describe the percentage of water in mammals?

	Of the body mass	Inside cells	Outside cells
A	%٧٠	%٤٧	%٢٣
B	%٧٠	%٢٣	%٤٧
C	%٢٣	%٧٠	%٤٧
D	%٤٧	%٢٣	%٧٠

112. All the following are catabolic process except.....

- A) Synthesis of proteins C) Breakdown of protein
B) Breakdown of carbohydrates D) Breakdown of glucose sugar

113. The following figures represent a model for the action mechanism of an enzyme inside the human body, which of the following represents letters (X), (Y) and (Z) respectively?

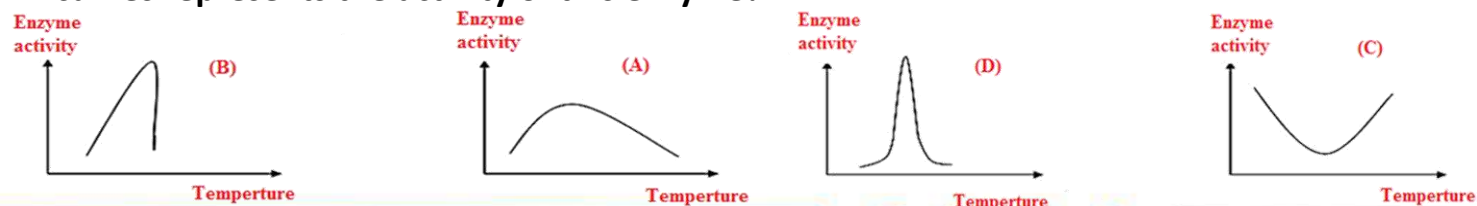


- a) Enzyme / Products / Substrate. c) Enzyme / Substrate / Products.
b) Substrate / Enzyme / Products. d) Substrate / Products / Enzyme

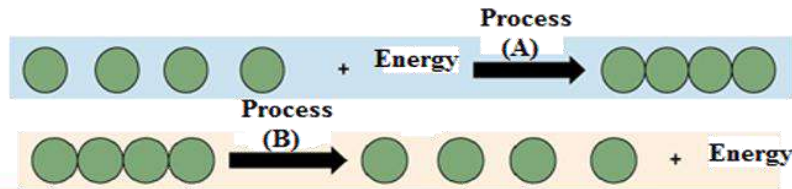
114. Which of the following factors directly slows down enzyme activity?

- a. Increasing the number of mitochondria c. Availability of "substrate" molecules in abundance
b. Raising the temperature above the optimal limit d. Increasing the size of the sap vacuole

115. If you know that enzyme (X) is sensitive to changes in temperature, which of the following curves represents the activity of this enzyme?

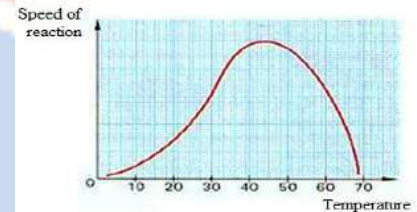


116. The opposite diagram represents vital processes occurring in a living organism. Study it and then determine:



- A. Process (A) occurs in the mitochondria, while process (B) occurs during muscle formation.
- B. Process (B) occurs in the mitochondria, while process (A) occurs during muscle formation.
- C. Both (A) and (B) occur in the mitochondria.
- D. Both (A) and (B) occur during muscle formation.

117. The opposite curve shows the activity of an enzyme at different temperatures. Study the curve and determine which of the following is true for this enzyme?



- a) The reaction rate reaches its highest level at 5°C
- b) All enzyme molecules are consumed at 70°C
- c) Enzyme activity is equal at 30°C and 60°C
- d) Enzyme activity is lowest at 45°C

Lesson 6:

118.It refers to the behavioral or physical traits of a living organism that help it to survive better in its ecosystem.

- a) transpiration.
- b) adaptation.
- c) respiration.
- d) excretion.

119. Ocean Bottom bony fish are structurally adapted by having...

- A. Swim bladder.
- B. Kidneys.
- C. A contractile vacuole.
- D. Wide eyes.

120. Icefish lives in the cold Southern Oceans at depths of up to approximately.....

- a) 2 km.
- b) 20 km.
- c) 200 km.
- d) 2000 km.

121. The streamlined body, mucus, and scales in fish help reduce water resistance to their movement. This is considered a _____ adaptation.

- a) Behavioral.
- c) Structural.
- b) Functional.
- d) Osmotic.

122. Which of the following are characteristics of deep-sea fish?

	Eyes	Body shape
A	Wide	compressed
B	Wide	Flexible
C	Narrow	compressed
D	Narrow	Flexible

123. Which of the following distinguishes dolphins from ice – fish?

- A- Streamlined shape.
- B- The presence of fins.
- C- The presence of gills.
- D- The presence of snorkels.

124. Which of the following organisms demonstrates a structural adaptation that distinguishes it from other species at the same taxonomic level?

- A. Tilapia. B. Salmon. C. Ice – fish. D. Dolphins.

125. Each of the following is considered a reason for performing the behavioral adaptation by living organisms, except.....

- a) avoiding the hardships. b) accomplishing the reproduction process.
c) better use of the available resource. d) being able to breathe.

126. The whales use their in communications, and hunt their preys.

- a) bodies colors. b) sounds. c) big eyes. d) fins.

127. Factors that lead to behavioral adaptation include...

- A. Oxygen deficiency. B. Water depth. C. Reproduction. D. Water resistance.

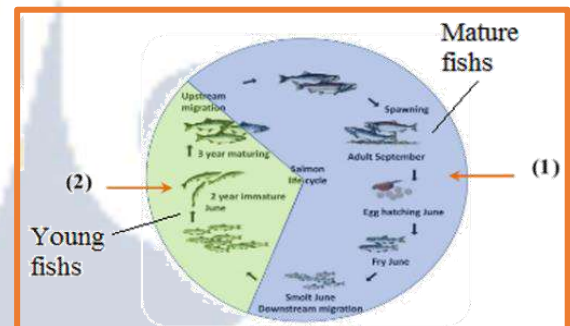
128. The opposite figure shows salmon fish migration, which is an adaptation.....

- A. Behavioral only. B. Physiological only.
C. Behavioral and Physiological combined. D. Not considered an adaptation.



129. The figure shows the life cycle of salmon. Study it and then determine which of the following represents stages (1) and (2) indicated by the arrow?

	(1)	(2)
A	River	Sea
B	River	River
C	Sea	Sea
D	Sea	River



130. What is the environment in which each of the following occurs for salmon?

	The environment in which it is born	The environment in which it lives until sexual maturity	The reproductive environment
A	River	Sea	River
B	Sea	River	River
C	River	River	Sea
D	Sea	Sea	River

131. Which of the following is true about salmon?

- A. The osmotic pressure inside the cells of young fish is higher than the osmotic pressure of the surrounding medium.
B. The osmotic pressure inside the cells of young fish is lower than the osmotic pressure of the surrounding medium.

- C. The osmotic pressure inside the cells of adult fish is higher than the osmotic pressure of the surrounding medium.
D. The osmotic pressure inside the cells of adult fish is equal to the osmotic pressure of the surrounding medium.

132. In salmon fish...

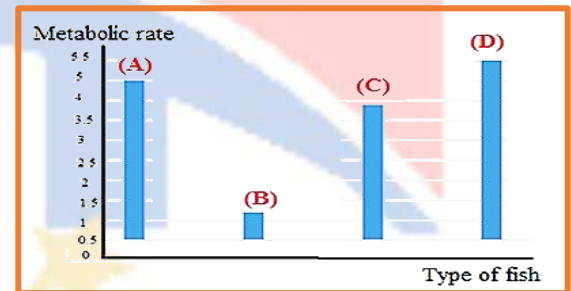
- A. Adult fish get rid of excess water. B- Adult fish get rid of excess salts.
C- Young fish swallow large amounts of water. D- Young fish get rid of excess salts.

133. What are types of adaptations that deep-depths fish use to adapt to high pressure of water?

- A) Structural only. B) Structural and physiological together.
c) Physiological only. D) Structural and behavioral together.

134. The graph represents the relation between some marine fish and the its metabolic rate, Study it and then determine: Could anyone choose to live in deep waters?

- a) (A).
b) (B).
c) (C).
d) (D).



135. Viper fish has high concentrations of hemoglobin in its blood to adapt to the.....

- a) lack of oxygen. b) high salinity. c) high pressure. d) darkness.

136. Which of the following is a physiological change in deep ocean fish?

- A. Compact body B. Strong arteries C. Slower metabolic rate D. Large gills

137. Which of the following distinguishes deep-sea fish in terms of the composition of their blood vessels?

- A- Strong and robust. B- Weak and thin. C- Strong and thin. D- Weak and thick.

138. Deep-sea fish withstand high pressure because.....

- a) they have flexible bodies and reduced air spaces. b) their bones are filled with air.
c) they use lungs to equalize pressure. d) they produce oxygen internally.

139. Among the adaptations of deep-sea fish: Adaptation (I): Strong arteries and veins.

Adaptation (II): Special abilities to regulate respiration under oxygen-deficient conditions.

In the following table, what type of adaptation are (I) and (II) respectively?

Choice	Adaptation (I)	Adaptation (II)
a	Physiological adaptation	Structural adaptation
b	Structural adaptation	Physiological adaptation
c	Physiological adaptation	Physiological adaptation
d	Structural adaptation	Structural adaptation

140. The osmotic pressure in the bodies of fresh water fish is:

- A. Low, causing them to lose water from their bodies.
- B. High, causing them to lose water from their bodies.
- C. Low, causing their bodies to gain water.
- D. High, causing their bodies to gain water.

141. Which of the following results from freshwater gardening (fish) is the elimination of excess body fluid?

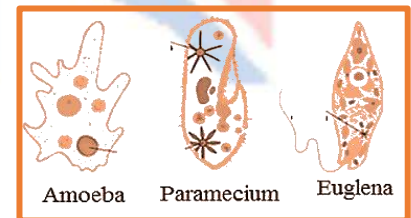
- A. The presence of a contractile system that helps expel excess water.
- B. The excess urine produced by the body is diluted.
- C. The blood contains a high percentage of urea.
- D. The presence of openings at the top of the head.

142. Unicellular organisms, such as amoeba, obtain oxygen and get rid of carbon dioxide through:

- A. The plasma membrane by diffusion.
- B. The contractile vacuole by diffusion.
- C. The plasma membrane by osmosis.
- D. The contractile vacuole by osmosis.

143. Amoeba, Paramecium, and Euglena are similar in.....

- A. They contain pseudopods (contractile vacuole) from the excess body.
- B. The osmotic pressure outside them is equal to pressure inside them.
- C. The osmotic pressure outside them is higher than inside them.
- D. They are multicellular organisms.



144. Amoeba adapted to low osmotic pressure. Which component performs each of the following?

	Collect excess water	Discharge excess water from the cell
A	Contractile vacuole	Plasma membrane
B	Plasma membrane	Plasma membrane
C	Plasma membrane	Contractile vacuole
D	Contractile vacuole	Contractile vacuole

145. Which of the following happens to an amoeba when its contractile vacuole is removed?

- A- The amoeba regulates its water needs naturally.
- B- The amoeba can easily get rid of excess water.
- C- The osmotic pressure inside it increases.
- D- The osmotic pressure inside it decreases.

146. The ratio between the osmotic pressure for fresh water to the osmotic pressure for the body fluids inside the living organisms that live in this water is.....

- a) greater than 1.
- b) less than 1.
- c) equal 1.
- d) equal zero.

147. A 10% saline solution and a 15% sugar solution are separated by a semi permeable membrane. What happens?

- A. Water moves from the saline solution to the sugar solution.
- B. Water moves from the sugar solution to the saline solution.
- C. Salt moves from the saline solution to the sugar solution.
- D. Salt moves from the sugar solution to the saline solution.

148. Which of the following expresses the correct arrangement for osmotic pressure?

- A. Fresh water < Solutions inside saltwater fish < Solutions inside freshwater fish < Seawater.
B. Fresh water < Solutions inside freshwater fish < Solutions inside saltwater fish < Seawater.
C. Seawater < Solutions inside freshwater fish < Solutions inside saltwater fish < Fresh water.
D. Seawater < Solutions inside saltwater fish < Solutions inside freshwater fish < Fresh water.

149. Fish that live in salt water...

- A. The osmotic pressure outside them is lower than inside them.
B. Water moves from their bodies to the outside.
C. They get rid of excess water through the contractile vacuole.
D. The osmotic pressure inside them is lower than outside them.

150. Sea fish facing water salinity by:

- A. Swallowing large quantities of water, controlling blood urea levels.
B. The kidneys, where excess salts are eliminated in the form of dilute urine.
C. The contractile vacuole. D. Large gills.

151. Osmotic adaptation of adult salmon allows them to:

- A. Moving from fresh water to salt water B. Moving from salt water to fresh water
C. Remaining in salt water D. Remaining in fresh water

Lesson 7:

152. The mass of a gas that should be dissolved to a cup of pure water to form solution of volume 0.25 L, so that the solubility is 35 mg/L is equal to....

- A-8.75 mg. B- 17.5 mg. C- 25 mg. D- 70 mg.

153. If we have two identical water tanks — one with fresh water and one with salt water at the same temperature, both aerated equally — in which tank will dissolved oxygen be higher?

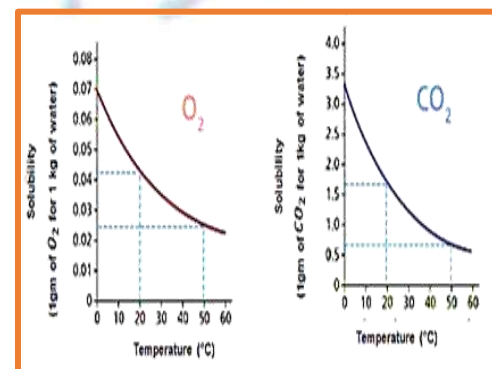
- A- In salt water, because salt promotes oxygen solubility.
B- In fresh water, because gas solubility decreases with increasing salinity.
C- Equal concentration in both tanks.
D- Cannot be determined without knowing air pressure.

154. The ratio between the concentration of each of carbon dioxide and oxygen gases in the atmospheric air equalsapproximately.

- A. 500. B.0.05. C. 0.03. D. 0.002.

155. Analyze the two graphs shown From the figures, through the temperature range (20°C – 50°C), it is clear that by increasing the temperature, the:

- A. O₂ solubility decreases at a greater rate than CO₂ solubility.
B. The solubility of CO₂ decreases at a greater rate the solubility of O₂.
C. The solubility of both O₂, CO₂ decreases at the same rate.
D. The solubility of O₂, CO₂ is increasing at the same rate.



156. from the previous figure: when increasing the temperature,.....

	Solubility of O ₂	Solubility of CO ₂
A	Decreases	Increases
B	Increases	Decreases
C	Decreases	Decreases
D	Increases	Increases

157. The relationship between water temperature and the solubility of carbon dioxide is:

- A. Direct. B. Inverse. C. Constant. D. No relationship.

158. In an artificial lake, a massive fish kill was observed on a very hot sunny day. What is the most likely scientific explanation?

- A. A large increase in photosynthesis caused water toxicity.
B. A sharp decrease in dissolved oxygen due to high temperature.
C. A high decrease in pH of water. D. An increase in salinity due to evaporation.

159. In cold regions, water is richer in dissolved oxygen compared to tropical warm regions. What is the biological result of this difference?

- A. Marine organisms in cold regions are smaller in size.
B. Biodiversity is higher in cold regions.
C. Cold regions support larger and more active marine life.
D. There is no significant biological difference.

160. Some fish, like salmon, migrate to cold, oxygen-rich river sources to lay its eggs. Why?

- A. To avoid predators in warmer waters.
B. Because cold water provides higher dissolved oxygen levels essential for developing young fish.
C. Because food is more abundant in those regions.
D. Because water salinity is lower in river sources.

161. Which of the following choices expresses the correct arrangement for the solubility rate of oxygen gas in some water bodies?

- a) Fresh water at 20°C > salt water at 20°C > salt water at 5°C.
b) Salt water at 20°C > salt water at 5°C > fresh water at 20°C.
c) Fresh water at 5°C > salt water at 5°C > salt water at 20°C.
d) Salt water at 20°C > fresh water at 20°C > salt water at 5°C.

162. All of the following are considered sources of dissolved oxygen in water, except.....

- a) algae. b) atmospheric air. c) phytoplankton. d) zooplankton.

163. A dense fish farm was established in a closed pond. Which of the following measures is most important for maintaining fish survival?

- A. Adding aquatic plants in abundance to increase oxygen.
B. Installing aeration pumps (air pumps) to increase dissolved oxygen mechanically.
C. Heating the water to speed up fish growth.
D. Covering the pond to prevent evaporation.

164. What is the main source of the energy required for marine organisms to carry out their biological processes?

- a) O₂ gas. B) Glucose. C) CO₂ gas. D) Calcium carbonate.

165. Why are wave and wind movements important for aquatic life?

- A. They increase water depth.
B. They increase the surface temperature of water.
C. They enhance gas exchange between the atmosphere and water, increasing dissolved oxygen.
D. They prevent harmful algae growth.

166. How can a factory dumping organic waste into a river affect dissolved oxygen concentration?

- A. Waste increases water temperature, which decreases oxygen levels.
B. Waste directly consumes oxygen through chemical reactions.
C. Waste promotes bacterial growth that consumes oxygen during decomposition.
D. Waste prevents sunlight from reaching the water, which reduces photosynthesis and oxygen production.

167. When comparing a deep lake and a shallow lake in the same area, which one is expected to have greater daily variation in surface oxygen concentration?

- A. The deep lake, due to more water layers.
B. The shallow lake, because temperature and photosynthesis affect a smaller volume of water.
C. There is no difference between them.
D. It depends on the type of fish in each lake.

168. Which of the following human activities directly contributes to increasing carbon dioxide levels in water bodies?

- A. Overfishing. C. Building dams. B. Industrial pollution. D. Coastal tourism.

169. Increasing the percentage of CO₂ in the water works on:

- A- Increase acidification, increase calcification. B- Increase acidification, reduce calcification.
C- Reduce acidification, increase calcification. D- Reduce acidification, reduce calcification.

170. The studies have proven that the temperature of the upper part of the ocean water has increased by a certain amount every ten years over the last hundred years. In light of what you have studied, which of the following is from the results of that?

- A. Reducing the acidity of ocean water.
B. Increasing the percentage of carbon dioxide gas in the atmosphere.
C. Reducing the percentage of dissolved salts in water.
D. Increasing the percentage of oxygen in water.

171. What phenomenon describes the movement of gases from a high concentration region to a low concentration region?

- A. Osmosis. B. Diffusion. C. Photosynthesis. D. Respiration.

172. What happens to the pH value at.....?

	increasing of O ₂ in water	increasing of CO ₂ in water
A	Doesn't change	Increases
B	Doesn't change	Decreases
C	Increases	Doesn't change
D	Decreases	Doesn't change

173. The skeleton of tilapia is formed of.....

- A) chitin and calcium phosphate. b) chitin and calcium carbonate.
c) collagen and calcium carbonate. d) collagen and calcium phosphate.

174. Marine organisms such as corals and mollusks depend on calcium carbonate to build their....

- A. Internal skeletons. B. Shells and exoskeletons. C. Gills. D. Fins.

175. Increasing the percentage of CO₂ gas in water works to convert

- A. Calcium carbonate insoluble in water to calcium bicarbonate soluble in water.
B. Calcium carbonate soluble in water to calcium bicarbonate insoluble in water.
C. Calcium bicarbonate insoluble in water to calcium carbonate soluble in water.
D. Calcium bicarbonate soluble in water to calcium carbonate insoluble in water.

176. Some coral reefs suffer from the phenomenon known as “bleaching,” which is related to the increase in ocean acidity. What is the direct cause of this phenomenon?

- A. Decrease in dissolved oxygen. B. Increased dissolution of CO₂ forming carbonic acid. C.
Direct rise in water temperature. D. Pollution by heavy metals.

177. Which of the following best describes the dual effect of increasing carbon dioxide in water on organisms with calcareous structures?

- A. It facilitates respiration and strengthens their skeletons.
B. It increases water acidity, hindering shell formation but providing more carbon for photosynthesis.
C. It lowers water acidity, dissolving shells and reducing available oxygen.
D. It increases pH, making shell formation easier.

178. The opposite figure shows some aquatic organisms from (1) to (6) and the pH value of the water that is suitable for their living. Which of these organisms is(are) more adapted to increasing the solubility of CO₂ gas in water?

- A) (1). B) (2), (3). C) (4), (5). D) (6).



179. Which of the following statements is correct about the life in an aquatic environment?

- A. The increase in respiration is accompanied by increasing calcification.
B. The increase in organic decomposition is accompanied by a decrease in water acidity.
C. The increase in acidification is accompanied by an increase in respiration.
D. The increase in water acidity is accompanied by reduced calcification.

180. If the energy flow rate that reaches from the green algae to the aquatic larvae that feed on it decreases, it indicates that.....

- a. The number of mollusks that feed on larvae increases.
- b. The percentage of dissolved oxygen gas in water increases.
- c. The algae lost their ability to produce energy due to organic remains.
- d. The percentage of dissolved carbon dioxide gas in water decreases.

Lesson 8:

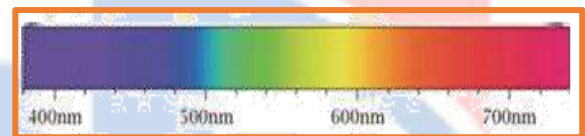
181. A small part of electromagnetic spectrum which differ from each other in frequencies and wave lengths refers to

OR The electromagnetic spectrum which propagates in the form of electromagnetic waves represents

- A) Invisible spectrum.
- b) Visible spectrum.
- c) X-rays.
- d) Gamma rays.

182. In the opposite figure, the ratio between frequency of red and that of violet spectrum equals to

- a) $1 \setminus 1$.
- b) $4 \setminus 7$.
- c) $7 \setminus 4$.
- d) $1 \setminus 2$.

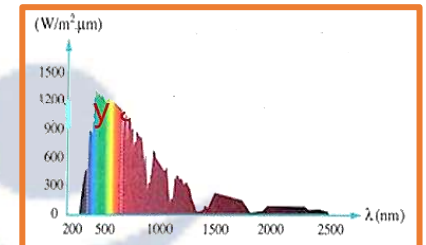


183. The visible light composed of different spectrum colors, which of the following has the maximum wave length?

- a) yellow color.
- b) orange color.
- c) green color.
- d) blue color.

184. The opposite graph represents the relation between light intensity and wavelength, so the ratio between the intensities of the wavelengths 500 nm and 1500 nm of solar radiation, respectively, at sea level is.....

- a) Equals to 1.
- b) Less than one.
- c) Greater than one.
- d) No relation.



185. The amount of solar energy that penetrates the water surface depends on at which the sun rays strike it.

- A. Intensity.
- B. Angle.
- C. Velocity.
- D. Wave length.

186. The amount of light that penetrates the water surface increases when the angle between the incident sun's rays and the water surface 90°

- a) Equals to.
- B. More than.
- C. Less than.
- D. Both A and B.

187. Which two quantities of the following decrease in magnitude with increasing depth in the Red Sea water in summer?

- a) Water density and its pressure.
- b) Water density and its temperature.
- C) Water temperature and its pressure.
- D) Water temperature and light intensity through it.

188. The figure at the front of you shows the solar radiation that fall inclined on the water surface, so the amount of energy that penetrates the water surface by decreasing inclination angle with the water surface.

- a) increases.
- b) decreases.
- c) unchanged.
- d) reduced.



189. When solar radiation passes through the surface layer of ocean water,.....

- a) The longer wavelengths of visible light are firstly absorbed.
- b) The shorter wavelengths of visible light are firstly absorbed.
- c) All wavelengths of visible light are completely absorbed together.
- d) None of the wavelengths of visible light is absorbed.

190. At 10 m depth from the surface of water more than % of visible light is absorbed

- a) 1.
- b) 10.
- c) 50.
- d) 90.

191. All infrared energy from sunlight is almost absorbed by water at depth

- A. 100 m.
- B. 100 cm.
- C. 10 m.
- D. 10 cm.

192. Which of the following light colors is Scattered after penetrating the surface of a water body?

- A. Warm colors.
- B. Cooler colors.
- C. No color.
- D. All colors.

193. The ocean's water warm color of visible spectrum as red and orange

- a) Reflects.
- b) Absorbs.
- c) Scatters.
- d) Disperses.

194. Which of the following colors penetrates the deepest clear tropical water?

- a) Red – 1%.
- b) Blue – 1%.
- c) Red – 50%.
- d) Blue – 50%.

195. In clear water Aquatic plants and Algae grow well down to depth of meters

- A. 100.
- B. 50.
- C. 10.
- D. 1.

196. Autotrophic organisms such as are abundant in the surface layer of water.

- a) Plants.
- b) Algae.
- c) Phytoplankton.
- d) All the previous.

197. Coral reefs thrive in water near the equator.

- A. Depth cold.
- B. Shallow cold.
- C. Shallow warm.
- D. Depth warm.

198. From tropical fish that live in warm water and require a specific temperature are.....

- a) Tuna and barracuda.
- b) only tuna.
- c) Only barracuda.
- d) Code.

199. Cold-water fish which live far from the equator are.....

- A. Tuna.
- B. Cod.
- C. Barracuda.
- D. Coral.

200. Fluids include substances.

- a. solid and liquid.
- b. solid and gaseous.
- c. liquid and gaseous.
- d. solid, liquid and gaseous.

201. All the following are properties of the liquids except

- a. no ability to flow.
- b. has almost definite volume.
- c. resists compression.
- d. takes the shape of the container.

202. Which of the following are measuring units of pressure?

- a. N/m² and Joule.
- b. N/m² and atm.
- c. Joule and atm.
- d. N/m² , Joule, and atm.

203. A liquid has a pressure at any point inside it equal to the of the liquid column above that point acting on the unit area of that point.

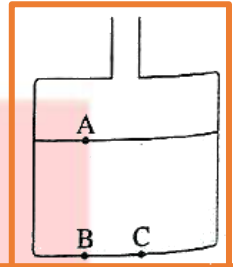
- a. density.
- b. volume.
- c. weight.
- d. mass.

Lesson 9:

204. Which has the greatest effect on increasing the pressure at a point inside a static liquid?

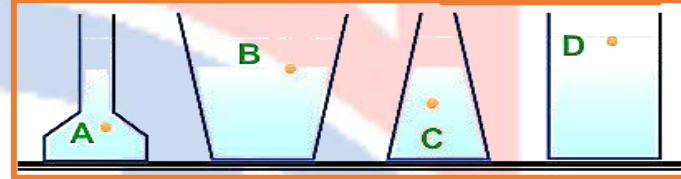
- A) Increasing the surface area of the liquid. B) Increasing the density of the liquid.
C) Increasing the viscosity of the liquid. D) Increasing the temperature of the liquid.

205. The opposite figure shows three points A, B and C in a glass tank that contains an amount of water which is exposed to atmospheric pressure, so the correct order of pressure values at the three points is.....



- a) $P_A > P_B = P_C$. b) $P_A > P_B > P_C$. c) $P_A < P_B < P_C$. d) $P_A < P_B = P_C$.

206. If a set of containers are filled with water as shown in the figure, the correct order of points A, B, C, D according to pressure is?



- $P_A > P_B > P_C > P_D$. b) $P_D > P_C > P_B > P_A$.
c) $P_A > P_C > P_B > P_D$. d) $P_D > P_B > P_C > P_A$.

207. Some animals can dive to a depth of 0.5 km.

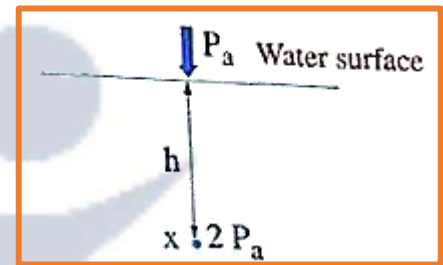
What is the total pressure they can withstand at this depth?

- a) 0.5 atm. b) 1.5 atm. c) 50 atm. d) 51 atm.

208. A submarine collapsed at a depth of 4000 m below the sea surface, if the pressure inside it was equal to atmospheric pressure, then the difference in pressure between the inside and outside of the submarine at that depth was.....

- a) 25 atm. b) 125 atm. c) 369 atm. d) 400 atm.

209. In the opposite figure, if the total pressure at point (x) at depth (h) in ocean water is double the atmospheric pressure at water surface, so at depth (3 h) from the surface of ocean water, the total pressure is.....



- a) 3 Pa. b) 5 Pa. c) 4 Pa. d) 6 Pa .

210. Water pressure increases by approximately for every 10 m below the surface.

- a. 1 N/m². b. 1 atm. c. 10 N/m². d. 10 atm.

211. How do fish living at great depths adapt to high pressure?

- A) By increasing the size of their swim bladder. B) By reducing the density of their bodies.
C) By increasing their heart rate. D) By increasing the size of their gills.

212. What is the main function of the swim bladder in fish that live at intermediate depths?

- a) Produces heat to maintain body temperature. b) Helps in digestion.
c) Controls buoyancy. d) Stores oxygen for respiration.

213. What is the importance of the unsaturated fatty acids in the composition of cell membranes of deep-sea fish?

- A) Increases the rigidity of the membranes. B) Maintains the fluidity of the membranes.
C) Increases the permeability of the membranes. D) Reduces the surface area of the membranes.

214. What is the main advantage of the cartilaginous skeleton in fish like sharks?

- a) It provides greater strength. b) It provides greater flexibility.
c) It makes the fish heavier. d) It provides no special advantage.

Lesson 10:

215. Which of the following expresses the final stability resulting from the interaction of living organisms with non-living environmental components for the continuity of life?

- a. Ecological balance.
- b. Nutrient balance.
- c. Aquatic system balance.
- d. Natural energy flow between living organisms.

216. What is the main purpose of maintaining ecological balance in aquatic ecosystems?

- a. To increase the population of all organisms.
- b. To ensure the continuous flow of energy through the food web.
- c. To increase the production of fish and other seafood.
- d. To maintain the dynamic stability of the ecosystem.

217. Which of the following elements is the most harmful to the health of aquatic organisms when its concentration in water increases?

- a. Nitrogen.
- B.Oxygen.
- c.Lead.
- d.Phosphorus.

218. How does the migration of salmon contribute to achieving balance in the surrounding environment?

- a. Consumes the largest amount of phytoplankton.
- b. Helps increase the number of predators.
- c. Compensates for its loss during its life cycle.
- d. Helps preserve coral reefs.

219. Coral reefs are known as "rainforests of the sea," and this is because they:

- a. Are considered producer organisms.
- b. Eliminate sea urchins.
- c. Provide a suitable habitat for many marine organisms.
- d. Serve as a shelter and safe haven for large predatory fish.

220. Which of the following factors is most likely to increase biodiversity within the aquatic environmental area?

- a. Increase in carbon dioxide ratio.
- b. Increase in predatory fish.
- c. Increase in salinity rates in water.
- d. Increase in phytoplankton.

221. When nutrient levels in an aquatic ecosystem are excessive, it leads to:

- a. Decreased plant growth rate.
- b. Increased biodiversity.
- c. Abnormal algae bloom.
- d. Ecosystem stability.

222. How does energy flow in an aquatic food web?

- a. From producers, such as algae, to consumers, such as herbivorous and predatory fish.
- b. Directly from predators to plants.
- c. From nitrogen to phosphorus.
- d. From deep-sea organisms to surface-dwelling organisms.

223. What is the most accurate explanation for the disruption of ecological balance in a lake over the long term after a decrease in green algae?

- a. Decrease in nutrient ratios.
- b. Consumption of the majority of dissolved oxygen gas.
- c. Increase in carbon dioxide gas concentration.
- d. Production of a large amount of oxygen.

224. What is the main cause of biodiversity loss in aquatic ecosystems?

- a. Sustainable fishing.
- b. Habitat destruction.
- c. Natural predation.
- d. Balanced nutrient levels.

225. Which of the following is NOT a negative impact of human activities on aquatic ecosystems?

- a. Pollution from pesticides and heavy metals.
- b. Sustainable development programs.
- c. Overfishing.
- d. Destruction of natural habitats, such as coral reefs.

226. Which of the following human activities leads to ecological imbalance in aquatic ecosystems?

- a. Pollution.
- b. Overfishing.
- c. Habitat destruction.
- d. All of the above.

227. Some studies have shown that climate changes increase imbalance in aquatic systems, threatening the balance among aquatic organisms. To preserve the aquatic ecosystem's ability for ecological balance, which of the following can be adopted?

- a. Protecting and expanding biodiversity areas such as coral reefs.
- b. Increasing the number of primary predatory species to maintain the food chain structure.
- c. Building artificial barriers to control environmental temperatures.
- d. Introducing species that resist temperature changes.

228. A marine area in one of the lakes faces a challenge of high pollution rates, where agricultural sewage water rich in nitrogen and phosphorus is discharged into this lake, disrupting nutrient balance and negatively affecting the balance among organisms in this aquatic system. Which of the following represents the best solution that reflects the positive role of humans in addressing the problem?

- a. Artificially pumping oxygen into the water regularly to combat oxygen deficiency resulting from the imbalance.
- b. Manually removing surface algae periodically to reduce biomass.
- c. Reducing excess nutrients before they reach the aquatic system, addressing the problem at the source.
- d. Banning fishing in the entire area.

229. Which of the following is NOT a role that humans can play to help maintain ecological balance?

- a. Preserving natural resources.
- b. Limiting environmental awareness programs.
- c. Promoting sustainable development.
- d. Avoiding pollution and overuse of resource.

230. How can humans contribute effectively to preserving natural resources?

- a. By promoting pollution.
- b. By using resources sustainably and avoiding overexploitation.
- c. By destroying coral reefs for economic purposes.
- d. By reducing environmental awareness initiatives.

231. Which of the following is not a strategy humans can use to maintain ecological balance in aquatic ecosystems?

- a. Preserving natural resources.
- b. Promoting unsustainable development.
- c. Increasing environmental awareness and education.
- d. Participating in environmental policy initiatives.

232. Which of the following is not from the followed methods that are used in the sustainable agriculture?

- a. Drip irrigation.
- b. Irrigation using stored rainwater.
- c. Increasing the cultivation of water-consuming plants.
- d. Increasing the cultivation of drought-resistant crops

233. A farmer suffers from a greater number of larvae that feed on the leaves of crops. Which of the following represents one of the solutions that belong to the concept of sustainable agriculture?

- a) Using specialized pesticides for this type of larvae.
- b) Combating the larvae using natural enemies that feed on them.
- c) Adding fertilizers to the soil of the agricultural land.
- d) Increasing the agricultural area.

**Chapter 2:
Lesson 1:**

234. All of the following are from the main role of the atmosphere except....

- a) protects Earth from harmful solar radiation.
- b) maintain the planet's surface temperature at moderate levels.
- c) plays a major role in the water cycle in nature.
- d) control the Earth's gravitational force.

235. Which of the following statements is correct regarding the solar radiation that reaches Earth's atmosphere?

- a) The atmosphere retains all the solar radiation that reaches it.
- b) The atmosphere retains only a part of the solar radiation.
- c) The components of the atmosphere absorb all the incoming solar radiation.
- d) The atmosphere retains only the visible spectrum of solar radiation.

236.is the most abundant gas in Earth's atmosphere.

- a) Oxygen gas.
- b) Nitrogen gas.
- c) Hydrogen gas.
- d) Carbon dioxide gas.

237. Although nitrogen gas is highly abundant in the atmosphere, its oxides are found in very small quantities because...

- a) it is produced from the decomposition of animals and plants.
- b) its reactions require special conditions such as lightning or extremely high temperatures.
- c) it reacts with oxygen at low temperatures.
- d) it reacts with oxygen during natural phenomena such as rainfall.

238. Argon makes up about of the Earth's atmosphere.

- a) 0.04%.
- b) 0.93%.
- c) 78%.
- d) 21%.

239. is one of the greenhouse gases that trap heat within the Earth's atmosphere.

- a) Nitrogen.
- b) Carbon dioxide.
- c) Oxygen.
- d) Argon.

240. The ratio of the volume of oxygen gas in the air to the total volume of air is approximately.....

- a) $\frac{3}{4}$.
- b) $\frac{1}{2}$.
- c) $\frac{4}{5}$.
- d) $\frac{1}{5}$.

241. The ratio of the volume of argon gas to the volume of carbon dioxide gas in the atmosphere is...

- a) $\frac{21}{4}$.
- b) $\frac{78}{21}$.
- c) $\frac{4}{93}$.
- d) $\frac{93}{4}$.

242. Most weather phenomena occur in the

- a) Mesosphere.
- b) Troposphere.
- c) Thermosphere.
- d) Ionosphere.

- 243.** The troposphere layer extends up to about above the Earth's surface.
a) 100 km. b) 20 km. c) 10 km. d) 50 km.
- 244.** The stratosphere extends from an altitude of km up to about km above Earth's surface.
a) 10-50. b) 10-30. c) 20-30. d) 10-40.
- 245.** The thickness of the mesosphere is about.....
a) 20 km. b) 30 km. c) 50 km. d) 80 km.
- 246.** Which layer used in long-distance wireless communication due to its ability to reflect radio waves?
a) Troposphere. b) Stratosphere. c) Mesosphere. d) Ionosphere.
- 247.** The layer that absorbs short-wavelength ultraviolet (UV) radiation is layer.
a) Argon. b) Ozone. c) Nitrogen. d) Oxygen.
- 248.** The temperature remains relatively constant in the lower stratosphere until around km.
a) 10. b) 20. c) 50. d) 40.
- 249.** The ozone layer extends approximately from km up to Km, above the Earth's surface.
a) 20-50. b) 10-40. c) 20-40. d) 20-60.
- 250.** The temperature at the Mesosphere layer drops to
a) -90°C. b) -93°C. c) -39°C. d) -50°C.
- 251.** The mesosphere plays a vital role in protecting life on Earth from
a) UV radiation. c) high temperature. b) meteors. d) Comets.
- 252.** The atmosphere layer that extends from 80km to about 550 km above the Earth surface.
a) Ionosphere. c) Troposphere. b) Mesosphere. d) Stratosphere.
- 253.** is the highest layer of Earth's atmosphere.
a) Stratosphere. c) Exosphere. b) Mesosphere. d) Ionosphere.
- 254.** The exosphere extends from an altitude of about km to km above Earth's surface.
a) 600-1000. b) 700-1000. c) 700-1200. d) 700-800.
- 255.** The thickness of the thermosphere is approximately
a) 30 km. b) 40 km. c) 620 km. d) 700 km.
- 256.** A thin layer of air that acts as a transitional zone between the troposphere and the stratosphere is called the.....
a) tropopause, which protects Earth from harmful radiation.
b) tropopause, which prevents the mixing of air between the two layers.
c) ozone layer, which protects Earth from harmful radiation.
d) ozone layer, which prevents the mixing of air between the two layers.
- 257.** The atmospheric layer preferred for airplanes flight is.....
a) troposphere, because it is characterized by horizontal air movement.

- b) troposphere, because it is characterized by vertical air movement.
c) stratosphere, because it is characterized by horizontal air movement.
d) stratosphere, because it is characterized by vertical air movement.

258. Which layer of the atmospheric layers has the.....

	lowest air density?	highest air density?
(a)	Troposphere	Exosphere
(b)	Stratosphere	Troposphere
(c)	Exosphere	Troposphere
(d)	Exosphere	Stratosphere

259. In the opposite figure, if the air temperature at the Earth's surface is 30°C , then the ratio between the air temperatures at points X and Y on the Celsius scale ($t_x \backslash t_y$) is.....

- a) $9 \backslash 7$. b) $7 \backslash 9$. c) $13 \backslash 24$. d) $24 \backslash 13$.

260. The following table shows four gases W, X, Y, and Z and the effective speed of the molecules of each, Which gases may become rare or entirely absent on the surface Earth?

The gas	The effective (V_{rms}) of its molecules
W	8.2 km/s
X	10 km/s
Y	11.2 km/s
Z	15 km/s

- a) W and X only. b) Y and Z only c) W and Y only. d) X and Z only.

261. (V_{rms}) refers to of gas molecules.

- a) the effective speed. c) the average speed. b) the escaping speed. d) the instantaneous speed.

262. In the atmosphere, Nitrogen (N_2) , Oxygen (O_2) molecules and atomic oxygen absorb photons of electromagnetic spectrum with wavelengths shorter than.....

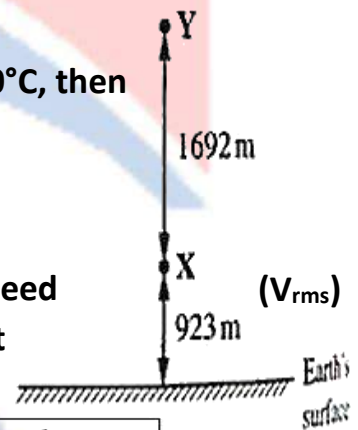
- a) 240 nm. b) 420 nm. c) 250 nm. d) 120 nm.

263. Formation of ozone (O_3), causes the absorption of photons in the ultraviolet region with wavelengths ranging from to

- a) 250-300. b) 240-310. c) 200-240. d) 150-300.

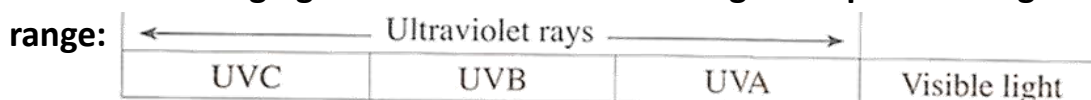
264. The ultraviolet rays compared to the visible spectrum have.....

- a) A longer wavelength, more energy. b) A shorter wavelength, more energy.
c) A longer wavelength, less energy. d) A shorter wavelength, less energy.



Lesson 2:

265. The following figure shows some electromagnetic spectrum regions and their wavelengths range:



(1) Which of these regions its rays cause photodissociation for oxygen molecules in the stratosphere? a) Visible light region. b) (UVA) region. c) (UVB) region. d) (UVC) region.

(2) Which of these regions' rays are absorbed by ozone after its formation in the stratosphere?

- a) All rays of the UVA region. b) All rays of the UVC region.
c) Part of the rays of the UVA and UVB regions. d) Part of the rays of the UVB and UVC regions.

266. The Ozone gases is formed in the atmosphere by the effect of

- a) Infrared radiation. b) Ultraviolet radiation. c) Gamma rays. d) X-rays.

267. When the bond between the two oxygen atoms in an oxygen molecule is broken due to photodissociation are formed.

- a) two oxygen ions (O^{-2}). b) two single oxygen atoms (O).
c) one oxygen atom (O) and one oxygen ion (O^{-2}).
d) two single oxygen atoms (O) and two oxygen ions (O^{-2})

268. Which of the following represent the right equations describe the formation of ozone gas?

- a) $O_2 \text{ (gas)} + \text{UV rays} \rightarrow O \text{ (gas)} + O \text{ (gas)}$. b) $O_2 \text{ (gas)} + \text{UV} \rightarrow O_3$.
c) $O_2 \text{ (gas)} + O \text{ (gas)} \rightleftharpoons O_3$. d) (a) and (c).

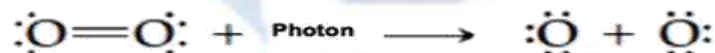
269. An ozone molecule is formed by the combination of

- a) two oxygen molecules (O_2). b) two individual oxygen atoms (O).
c) three individual oxygen atoms (O).
d) one individual oxygen atom (O) and one oxygen molecule (O_2).

270. What is the type of the bonds between the oxygen atoms in Ozone molecules.

- a) Ionic bond. b) Covalent. c) Physical bond. d) None of all.

271. What type of reaction is represented by the following equation?



- a) Photodissociation. c) Thermal dissociation. b) Nuclear dissociation. d) Ionic dissociation.

272. Which of the following ultraviolet wavelengths causes photodissociation of the covalent bond in an oxygen molecule?

- a) 230 nm. b) 240 nm. c) 290 nm. d) 305 nm.

273. Which of the following could represent the first step in the formation of ozone gas?



274. The chlorofluorocarbons (CFCs) resulted from

- a) photosynthesis process. b) industrial activities. c) respiration process. d) transpiration process.

275. The damage of skin cells can cause that may result in skin cancers.

- a) Genetic mutations. b) Melanoma. c) Anemia. d) (a) and (b).

276. Deterioration of Ozone occurs mainly due to the release of chemical compounds containing and

- a) Chlorine , Bromine. b) Chlorine , Nitrogen. c) Nitrogen , Oxygen. d) Hydrogen , Oxygen.

277. How the eyes of the human affected by UV rays?

- a) development of the cataract. b) the development of eyes cancer.
c) (a) and (b). d) None of the all.

278. From the actions that should be followed to reduce the ozone layer depletion are

- a) using chlorine and bromine compounds in cleaning products.
b) avoid using (CFCs) compounds in cooling systems.
c) using fire extinguishers contains halons gas. d) (a) and (c).

279. From the actions of reducing ozone layer depletion,.....

- a) Using chlorine and bromine compounds in cleaning products.
b) Using fire extinguishers that contain halon gas.
c) Using CFCs in cooling systems. d) Using 410A gas in cooling systems.

280. Which of the following options represents some of the health effects of ozone gas on humans?

- a) Cataracts, skin cancer, and decline in bee populations.
b) Skin cancer, weakened immunity, and destruction of plankton.
c) Reduced photosynthesis, impaired brain development.
d) Allergies, bronchitis, and cardiovascular diseases.

281. Smog is formed as a result of the accumulation of products from all the following reactions except

- a) the reaction of nitrogen and atmospheric oxygen during lightning.
b) the reaction of oxygen with sulfur under suitable conditions.
c) the reaction of hydrogen with oxygen under suitable conditions.
d) the reaction of nitrogen oxides with hydrocarbons in the presence of sunlight.

282. The ratio of ozone gas found in the stratosphere to that in the troposphere is.....

- a) less than 1. b) equal to 1. c) greater than 1. d) the answer cannot be determined.

283. Hereinafter some gases exist in the Earth's atmosphere: (I) Ozone gas, (II) Nitrogen dioxide, (III) Argon gas, (IV) Sulfur dioxide gas. Which of these gases contribute to the formation of smog?

- a) (I), (II) and (III). b) (III) and (IV). c) (II), (III) and (IV). d) (I), (II) and (IV).

Lesson 3:

284. A body with a temperature of 283 K equals on the Fahrenheit scale.

- a) 10 °F. c) 50 °F. b) 30 °F. d) 70 °F.

285. The boiling point of pure water equals

- a) 100 K. c) 373 °F. b) 212 °F. d) 373 K.

286. Which of the following expresses a form of adaptation to freezing?

- a) Producing a large amount of proteins before entering hibernation, as in the wood frog.
b) Producing a large amount of fats before entering hibernation, as in the wood frog.
c) Producing a large amount of antifreeze proteins, as in the ice fish.
d) Producing a large amount of antifreeze glucose, as in the ice fish.

287. When the sun's rays reach the Earth's surface:

(I) The temperature of the atmosphere begins to rise, and the temperature of the air layers near the Earth's surface becomes higher than the distant layers.

(II) Heat is transferred from the Earth's surface to the atmosphere.

(III) The temperature of the Earth's surface (land and water) begins to rise more than that of the atmosphere. (What is the correct order of the previous processes?)

- a) (I), (II) and (III). b) (III), (II) and (I). c) (II), (I) and (III). d) (I), (III) and (II).

288. The freezing point of pure water equals

- a) 0 K. c) 0 °F. b) 32 °F. d) -273 K.

289. At what temperature; the Fahrenheit scale equal to the Celsius scale?

- a) 20. b) - 20. c) 40. d) - 40.

290. Temperature is considered one of the most important climatic factors because it affects other factors such as:

- a) Atmospheric pressure and wind only. b) humidity only with.
c) Condensation and rainfall only. d) All of the above.

291. Meteorological agencies use which of the following scales to measure temperatures in scientific fields?

- a) Celsius scale. b) Fahrenheit scale. c) Kelvin scale. d) All of the above scales.

292. Study the following figure, then answer:

The suitable method for heat transfer through fluids is...

- a) conduction only. b) convection only.
c) convection and radiation. d) Conduction, convection and radiation.

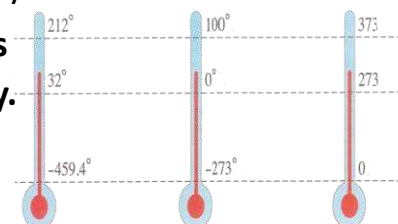


293. How does an icefish get oxygen?

- a) It is transported in the blood via hemoglobin. b) It secretes a transparent antifreeze protein.
c) It secretes a transparent antifreeze glucose. d) It absorbs oxygen directly from the water.

294. From the figure opposite, if the temperature on the Celsius scale rises by 1°C, it changes by on the Fahrenheit and Kelvin scales respectively.

- a) 1.8 - 1. b) 33.8 - 274. c) 1 - 1.8. d) 274 - 33.8.



295. The temperature scale in the Egyptian system is.....

- a) Kelvin scale. b) Fahrenheit scale. c) Celsius scale. d) Both of the above.

296. The heat transfer mechanism from the Sun to the Earth is.....

- a) radiation and conduction. b) convection and conduction. c) radiation only. d) convection only.

297. When you hold ice cubes, the heat is transferred.....

- a) from your hand to the ice by convection. b) from your hand to the ice by conduction.
c) from the ice to your hand by convection. d) from the ice to your hand by conduction.

298. When some birds fly without flapping their wings, they depend on.....

- a) The rising warm air currents due to convection.
b) The rising cold air currents due to convection.
c) The descending warm air currents due to convection.
d) The moving air currents opposite to its flying direction.

299. The wood frog can survive although its body partially freezes, due to.....

- a) changing skin color before freezing.
b) Storing small amounts of fats before freezing.
c) Reducing the amount of oxygen in the blood before freezing.
d) Producing large amounts of glucose in its vital organs before freezing.

300. How does the thorny devil lizard adapt to high temperatures and a dry desert environment?

- a) It changes its skin color to reflect more solar radiation and reduce heat absorption.
b) It increases its heart rate to increase blood flow to its skin for cooling.
c) It collects moisture from the air and directs it towards its mouth through small channels on its skin surface.
d) It stores small amounts of fat to cool its body.

301. If the atmospheric pressure at the top of a mountain is 750mm.Hg, it equals (Given that the usual atmospheric pressure equals $1.013 \times 10^5 \text{ N/m}^2 = 76 \text{ cm.Hg}$)

- a) 99967.11 N/m². c) 101300 N/m². b) 89967.11 N/m². d) 1013 N/m².

302. Which of the following correctly expresses the effect of atmospheric pressure on the amount of oxygen available for breathing?

- a) Less in areas of low pressure. b) More in areas of low pressure.
c) Equal in all areas of different pressures.
d) The amount in low-pressure areas is less than or equal to that in high pressure areas.

303. 8 millibar = a) 8000 N/m². c) 0.08 N/m². b) 800 N/m². d) 0.8 N/m²

304. Most of the atmosphere's mass is concentrated from the Earth's surface to an altitude of

- a) 10 km. b) 20 Km. d) 30 Km. c) 40 Km.

305. What unit is used to express pressure in meteorological maps?

- a) cm Hg. b) N/m². c) mm Hg. d) millibar.

306. The normal blood pressure in healthy adults is aboutmmHg

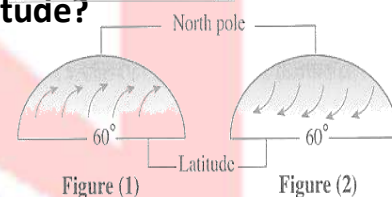
- a) 120/100. b) 120/80. c) 80/60. d) 150/120.

307. Which of the following blood components contain nutrients?

- a) Red blood cells. b) White blood cells. c) Blood platelets. d) Plasma.

308. Which of the opposite figures (1) or (2) correctly represents the direction of the polar winds between the north pole and the 60° latitude?

- a) Figure (1), because the atmospheric pressure is high at the north pole.
b) Figure (1), because the atmospheric pressure is low at the north pole.
c) Figure (2), because the atmospheric pressure is high at the north pole.
d) Figure (2), because the atmospheric pressure is low at the north pole.



309. If you have three different types of cells belonging to simple plant tissues, where cell (X) is a living cell thickened with a water-permeable substance, cell (Y) is a non-living cell, and cell (Z) has a thin cell wall and performs photosynthesis, which of the following represents the correct arrangement of (X), (Y), and (Z) cells, respectively?

- a) Parenchyma / Collenchyma / Sclerenchyma. b) Sclerenchyma / Parenchyma / Collenchyma.
c) Collenchyma / Sclerenchyma / Parenchyma. d) Parenchyma / Sclerenchyma / Collenchyma.

310. The cell walls of sclerenchyma tissue consist mainly ofsubstances.

- a) Cellulose and pectin. b) cellulose and lignin. c) pectin and chitin. d) cellulose and chitin.

311. The human body maintains a certain ratio of water and salts within it in a process known as.....

- a) Water balance (osmoregulation). C) Water pollution. b) Hibernation. d) Calcification.

312. All of the following are greenhouse gases that cause global warming except:

- a) CH₄. b) CFCs. c) O₃. d) N₂O.

Lesson 4:

313. All of the following are negative effects of global warming except:

- a) melting ice and flooding of coasts.
b) decreased biodiversity due to extinction of polar organisms.
c) drought waves and hurricanes.
d) decreased biodiversity due to extinction of desert organisms.

314. The increase in greenhouse gases in the atmosphere prevents the penetration of _____, causing global warming.

- a) ultraviolet rays. c) radio waves. b) infrared rays. d) microwave waves.

315. The main role of emissions from burning fossil fuels in causing global warming is...

- a) increasing Earth's surface absorption of sunlight.
b) forming a layer in the atmosphere that traps heat and prevents it from escaping.
c) directly reacting with polar ice, causing its melting.
d) increasing the amount of oxygen in the air, which raises its temperature.

316. In which of the following cases do cells resort to anaerobic cellular respiration?

- a) Increased oxygen in blood.
- b) Lack of carbon monoxide in the blood.
- c) Weak bonding of oxygen to hemoglobin.
- d) Lack of carbon dioxide in the blood.

317. Carbon monoxide gas is characterized from oxygen gas by.....

- a) its ability to bind to hemoglobin.
- b) its inability to bind to hemoglobin.
- c) having a binding ability to hemoglobin greater than nearly 250 times.
- d) having a binding ability to hemoglobin less than nearly 250 times.

318. Which of the following factors is a main catalyst for the conversion of sulfur dioxide to sulfur trioxide in the atmosphere?

- a) Increase in atmospheric humidity.
- B) Lack of oxygen.
- c) Sunlight.
- d) Ground-level ozone.

319. Which of the following steps begins the formation of sulfuric acid from acid rain?

- a. The reaction of sulfur trioxide with water.
- b. The oxidation of sulfur dioxide to sulfur trioxide.
- c. The oxidation of fossil fuels containing sulfur.
- d. The reaction of sulfur dioxide with water.

320. Which of the following is a direct effect of the compound formed from the reaction of NO_x with volatile organic substances in the presence of sunlight?

- a) Increasing the absorption of chlorophyll to light.
- b) Improving the plant's respiration.
- c) Reducing the respiration capacity.
- d) Increasing the soil fertility.

321. Which of the following compounds, when dissolved by acid rain, causes the corrosion of ancient statues?

- a) Sodium chloride.
- b) Ammonium bicarbonate.
- c) Calcium carbonate.
- d) Calcium phosphate.

322. All of the following are effects of acid rain on ecosystems except.....

- a) loss of biodiversity.
- b) the formation of ground-level ozone.
- c) the removal of nutrients.
- d) the destruction of monuments.

323. The occurrence of the following processes leads to the corrosion of building facades:

- (1) Binding of sulfur trioxide with water in the air.
- (2) The reaction of calcium carbonate with acid rainwater.
- (3) The oxidation of sulfur dioxide.
- (4) The oxidation of fossil fuels containing sulfur.

Which of the following represents the correct order of these processes?

- a) 4,1,2,3.
- b) 3,2,4,1.
- C) 4,3,1,2.
- d) 2,1,3,4.

324. Carbon monoxide is called the "silent killer" because.....

- a) It results from the incomplete combustion of fossil fuels.
- b) It causes respiratory irritation.
- c) It prevents oxygen from entering the respiratory system.
- d) It is an odorless toxic gas.

325. What is the essential role of gas scrubbers?

- a) The formation of sulfuric acid from sulfur oxides.
- b) The removal of sulfur and nitrogen oxides from factory air.
- c) The formation of nitric acid from nitrogen oxides.
- d) The removal of sulfuric and nitric acids from rain

326. Using climate models, it was predicted that the Earth's average temperatures would rise by about.....

- a) 1-1.5°C.
- b) 2-3°C.
- c) 0.5-1°C.
- d) 1.5-2°C.

Question 2:

Essay Questions:

A) Write the scientific term for each of the following statements:

1) A community of living organisms interacting with each other and with the other abiotic components.	(-----)
2) It is a nearly closed system that is able to change the Earth's surface physically, chemically, and biologically through a continuous change between the three states of water.	(-----)
3) It is a process by which the plant gets rid of excess water through the stomata.	(-----)
4) Microscopic openings found on the surfaces of leaves and green stems, through which most transpiration occurs.	(-----)
5) A measurement for the atom's ability to attract the electrons of the chemical bond towards itself for a longer period of time.	(-----)
6) An electrostatic attraction between the partially positive hydrogen atom in a water molecule and the partially negative oxygen atom in an adjacent water molecule.	(-----)
7) A scale that expresses the acidity or basicity of water. A scale in which values range from zero to 14.	(-----)
8) A solution in which the concentration of hydrogen ions is equal to the concentration of hydroxide ions.	(-----)
9) Any substance that can flow and does not have a fixed shape but takes the shape of its container.	(-----)
10) The mass of a unit volume of a substance.	(-----)
11) The ratio of the density of a certain substance to the density of pure water at 4°C	(-----)
12) - A quantitative description of the hotness or coldness of a body or a system. - A measure of the average kinetic energy of the molecules of a body or a system.	(-----)
13) Organisms that depend on external sources to regulate their body temperature.	(-----)
14) A homogeneous mixture of solvent and solute.	(-----)
15) The rate of liquid evaporation is equal to the rate of its vapor condensation at constant temperature and pressure in a closed system.	(-----)
16) The phenomenon of transferring the water molecules from a diluted solution to the concentrated solution through a semi-permeable membrane that separates between the two solutions.	(-----)

17) The pressure that causes the transfer of water from low-concentrated solution to high-concentrated solution through semi-permeable membrane.	(-----)
18) The most abundant chemical substance in living organisms and all vital processes depend on it.	(-----)
19) Specific catalysts or activators increase the speed of chemical reactions in the cell.	(-----)
20) A set of continuous biochemical reactions that occur inside the living organism's cells	(-----)
21) The minimum amount of energy required to start the chemical reaction.	(-----)
22) A structure that helps euglena to get rid of the excess water.	(-----)
23) A process on which many marine organisms depend to form their shells and skeletons.	(-----)
24) A solid substance that is slightly soluble in water and is used in the formation of the shells of marine animals.	(-----)
25) A water soluble substance is formed when carbon dioxide gas dissolved in water reacts with calcium carbonate.	(-----)
26) The weight of a liquid column per unit area whose height is from a certain point inside the liquid to its surface.	(-----)
27) An organ present in some fish which is filled with gases to allow them to control their depth in water.	(-----)
28) The gradual deterioration of the protective ozone layer in the atmosphere.	(-----)
29) The phenomenon of the continuous rise in the temperature of the air adjacent to the Earth's surface due to the greenhouse gases.	(-----)
30) * A group of gases in Earth's atmosphere traps heat and raises the temperature of the air adjacent to Earth's surface. * Gases cause the global warming phenomenon.	(-----)
31) Powerful computer models that describe the movement of atmosphere and its interactions.	(-----)

B) Give reasons for:

- 1) Condensation has an important role in the water cycle in nature.
(-----)
- 2) Water has an important role inside the living organisms' cells.
(-----)
- 3) The boiling point of water is high, even though it is a covalent compound.
(-----)
- 4) Water is a polar solvent.
(-----)

5) Dissolving table salt in water.

(-----)

6) Dissolution of sodium chloride in water is not considered a hydrolysis process.

(-----)

7) The solution resulting from the hydrolysis of ammonium bicarbonate in water is neutral.

(-----)

8) The solution resulting from the hydrolysis of sodium bicarbonate salt in water is alkaline.

(-----)

9) Density has a unit of measurement, while relative density has no unit of measurement.

(-----)

10) Fish live without freezing in frozen lakes or rivers.

(-----)

11) When a molten cake is taken out immediately from the oven, we perceive The chocolate to be much hotter than the cake.

(-----)

12) Water has a high specific heat compared to other liquids.

(-----)

13) Farmers in cold areas spray fruit trees with water.

(-----)

14) Water causes a moderate climate in coastal areas in both winter and summer.

(-----)

15) Pure water evaporates faster than aqueous solutions.

(-----)

16) The boiling point of a solution is higher than that of pure water at normal atmospheric pressure.

(-----)

17) Water is essential for life.

(-----)

18) Bacteria are prokaryotes organisms.

(-----)

19) The cell wall of the bacterial cell contains peptidoglycan.

(-----)

20) Water is considered a basic factor in maintaining internal balance and supporting the complex chemical activities of life.

(-----)

21) Living organisms maintain stable internal temperatures despite its fluctuations outside.

(-----)

22) The bony fish have a swim bladder or air sac.

(-----)

23) The living organisms in aquatic environment have the ability to effectively regulate blood pressure.

(-----)

24) Sea bottom fish have strong and hard arteries and veins.

OR The Viper Fish is characterized by the flexibility of its skeletal structures.

(-----)

25) The percentage of oxygen dissolved in Red Sea water is higher than that in water of Suez Gulf.

(-----)

26) When the percentage of carbon dioxide gas increases in water, the respiration process of marine organisms is negatively affected.

(-----)

27) In turbid water aquatic plants found closer to the surface?

Or Photosynthesis mainly occurs in the surface layers of water bodies.

Or Algae and phytoplankton are abundant in the surface layers of water bodies.

(-----)

28) Symbiotic algae live inside the coral tissue?

(-----)

29) Solar radiation is a vital factor in maintaining the ecological balance in aquatic environments.

(-----)

30) Marine organisms are distributed unevenly in the water?

(-----)

31) Tropical fishes such as tuna prefer to live in a tropical region?

(-----)

32) The organisms that live near the water surface have physical or body structure is less strong than those that live in the depths.

(-----)

33) Rays fish don't have swim bladders.

(-----)

34) Deep-sea fish have developed unique adaptations in their cell membranes to withstand the immense pressure at great depths.

(-----)

35) The importance of nutrient balance in aquatic environments.

(-----)

36) The negative impact of overfishing on the ecological balance of aquatic environments.

(-----)

- 37) The exosphere is an ideal region for placing satellites and spacecraft.
(-----)
- 38) Temperature of the thermosphere reaches higher than 2000°C .
(-----)
- 39) Ionosphere is used in long-distance radio communications.
(-----)
- 40) The Earth retains its atmospheric air.
(-----)
- 41) We must avoid using cleaning substances which contain bromine and chlorine compounds.
(-----)
- 42) The using of fire extinguisher that contains halon gas must be avoided.
(-----)
- 43) The excess exposure to the UV may cause skin cancer.
(-----)
- 44) Ozone has positive and negative effects.
(-----)
- 45) The effect of atmospheric pressure on weather and climate.
(-----)
- 46) The mountain climbers may suffer from the rupture of tiny capillaries in the nose.
(-----)
- 47) The necessity of maintaining normal blood pressure in a healthy person.
(-----)
- 48) The increase in greenhouse gases in the atmosphere causes the global warming phenomena.
(-----)
- 49) The recovery of some coral areas in the Great Barrier Reef in Australia after 2016.
(-----)

C) What happens in each of the following cases:

- 1) A quantity of pure water with a mass of 1 kg and a temperature of 8°C .
What happens to its density in each of the following cases:-
First: Adding 1 kg of pure water at a temperature of 8°C to it? (-----)
Second: Dissolving 34 g of table salt in it? (-----)
- 2) The Gulf stream carries warm water from the equator to the north Atlantic Ocean?
(-----)
- 3) reaching the effective speed of a gas molecules on Earth's surface till about 20 km/s.
(-----)

D) What is meant by:

- 1) Excretion. (-----)

2) The internal energy of the object equals 1000 Joules?

(-----)

3) The specific heat of liquid water equals 4180 J/Kg.K?

(-----)

4) The latent heat of vaporization.

(-----)

5) vapor pressure of a solution.

(-----)

E) Compare the following:

1) hydrolysis of (sodium bicarbonate, ammonium bicarbonate, and ammonium chloride):

P.O.C	sodium bicarbonate	ammonium bicarbonate	ammonium chloride
pH value of the solution			
The concentration of $[H^+]$ and $[OH^-]$			
Type of the solution			
Equation			

2) Kingdom Fungi and kingdom Protista.

P.O.C	Kingdom Fungi	kingdom Protista
number of cells		
mode of nutrition		
Examples		

3) Vertebrates animals and Invertebrates animals.

P.O.C	Vertebrates animals	Invertebrates animals
Definition		
Examples		

4) Catabolism and anabolism.

P.O.C	Catabolism	anabolism
Definition		
Energy		
Examples		

5) The method of adaptation to the aquatic environment in which they live.

P.O.C	Structural (Anatomical)	Behavioral	Physiological (functional)
Definition			
example			

6) Compare between fresh water fish and salt water fish in terms of:

P.O.C	Fresh water	Salt water
(a) direction of water flow between the fish's body and the aquatic environment.		
(b) The method of adaptation to the aquatic environment in which they live:		

7) The causes of acidification and calcification in terms of the percentage of dissolved CO₂ gas in water.

P.O.C	acidification	calcification
causes		

8) Bony fish (Osteichthyes) and Cartilaginous fish (Chondrichthyes) Concerning to:

P.O.C	Bony fish (Osteichthyes)	Cartilaginous fish (Chondrichthyes)
The type of its skeleton:		
Its weight		
Its flexibility		
Examples		

9) Satellite sensors and weather monitoring stations:

P.O.C	Satellite sensors	weather monitoring stations
Function:		

F) Variant questions:

- 1) Discuss the following: First:- The concept of environment. -----
Second:- Its components with examples.

Third:- Its types of spheres. -----

2) Why is the water cycle considered an almost closed system?

3) What are the main processes in water cycle?

4) Explain how clouds are formed and the importance of this process in the water cycle.

5) What are the biological processes that contribute to the water cycle?

6) What is the importance of the transpiration for the plants?

7) The figure shows two water molecules

(1) What are the types of bonds (1) and (2)?

(2) What is the value of the angle (3)?

(3) Indicate the number of the bond that leads to increasing the boiling point of water.

(4) Indicate on the figure the partial positive charge and the partial negative charge.

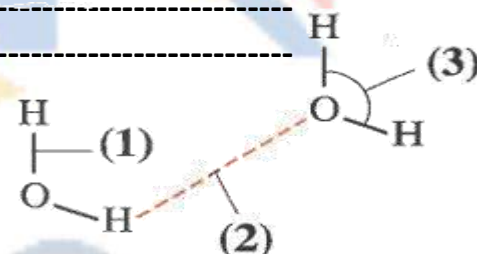
8) Mention the factors affecting on the density of the pure substance.

9) What are the factors affecting the amount of heat gained or lost by a substance for changing its temperature?

10) Calculate the final temperature of the mixture formed from mixing 100 kg of water at 50°C with 250 kg of water at 50°C?

11) A kettle holds 1.5 kg of liquid water at 50° C . How much heat energy (Q) must be supplied to bring the water to its boiling point (100°C)? (Given : the specific heat of water = 4180 J/Kg.K)

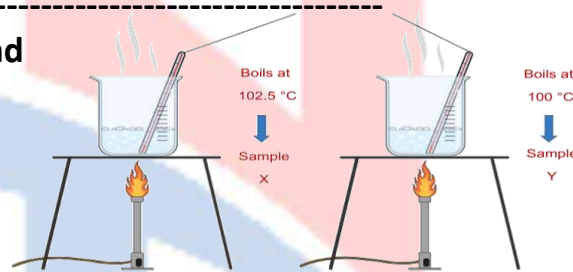
12) Considering the different specific heats of land and seawater, explain the phenomenon of the sea breeze.



13) Explain why the specific heat of water is a critical factor in the sustainability of marine life.

14) What is meant by the colligative properties of the solution? With determining them.

15) The figure shows two equal samples, one is pure water and the other is salt water. When both are heated to boiling, sample X is observed to boil at 102.5 °C, while sample Y boils at 100 °C. Indicate with an explanation which sample is pure water and which is salt water.



16) The following data table shows: Three samples of equal masses of impure water (X, Y, and Z) and the boiling point of each sample under a different atmospheric pressure.

The sample	Its boiling point
Sample X	101.5 °C
Sample Y	100.5 °C
Sample Z	102.5 °C

Arrange the three samples in ascending order by the value of the acting atmospheric pressure.

17) What factor in a living cell determines the classification of living organisms into two types?-----

18) Determine the factors by which eukaryotic organisms are classified?

19) Identify the structures that distinguish a plant cell from an animal cell, and state the function of each. . -----

20) Explain the importance of enzymes in vital processes within the body of a living organism.

21) What is meant by the thermal range of an enzyme? Explain its importance to the living organism.

22) How does a living organism adapt to its surrounding environment? Explain.

23) What is the role of gills in fish that live in salt water?

24) The figure shows an ice - fish. What do you know about this fish in terms of:

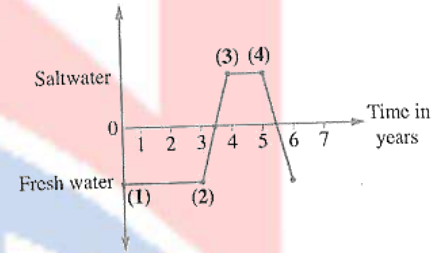


- (a) The habitat in which it lives? -----
(b) The depth at which it lives? -----
(c) The type of adaptation to suit its environment.

25) Although dolphins are mammals, they can live in water. Explain.

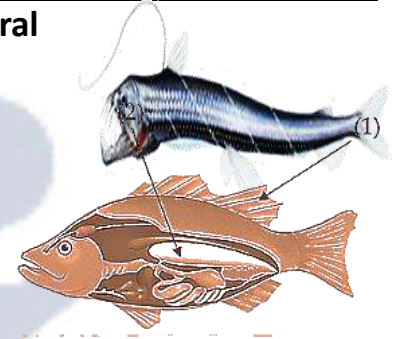
26) The opposite graph illustrates the migration of salmon fish from fresh water to salt water for reproduction. Study it, then answer: What number of stages represent:

- (a) The spawning of eggs? -----
(b) Sexual maturity? -----
(c) What is the number of the stage in which smoltification occurs? -----
27) What challenges do deep-water fish face? And how do they adapt to them structurally?



The challenges	the structure adaptation

28) The figure represents a viper fish, a deep-sea fish. Write two structural and physiological adaptations of this fish that enable it to live in its environment.



29) In the opposite diagram mention the name and the function of the labeled organs.

30) Explain how sharks have physiologically adapted to increase external osmotic pressure.

31) Think about what happens when tilapia fish move from the Nile River to the Mediterranean Sea.

32) What is the effect of fresh water on the osmotic pressure of freshwater organisms' cells? And how do these organisms deal with this effect?

33) What are the consequences of the inability of the following organisms to maintain balance of water and salts within their bodies? (A) Freshwater fish (B) Saltwater fish.

34) Physiological adaptations require structural adaptations to occur. Give one example

35) Define the concept of "gas solubility in water" and mention two main factors that affect it.

36) Describe the relationship between water temperature and the amount of dissolved oxygen. Why is this relationship important for fish?

37) Briefly explain how both photosynthesis and respiration of aquatic organisms affect the concentration of dissolved oxygen in water.

38) When studying an aquatic environment, an increase in swimming, hunting, and breeding activity is observed. Name one factor that leads to this?

39) How can a factory dumping organic waste into a river affect dissolved oxygen concentration?

40) Explain why marine organisms that build shells and skeletons (such as oysters and corals) need an aquatic environment that is not highly acidic. Relate your answer to the increase in carbon dioxide in the atmosphere.

41) "The life in aquatic environment depends on a certain range of carbon dioxide gas concentration in water." Explain this statement.

42) The light intensity gradually decreases by increasing water depth, the gradient of light defines different zones in oceans. Arrange these zones from the lightest zone to the darkest zone?

43) From opposite figure which shows the gradual penetration of Solar radiation through water surface, Mention what is the role of solar radiation in maintaining the ecological balance in the oceans?



44) Explain the relationship between symbiotic algae and coral tissues?

45) Explain the following statement: The disruptions in ecological balance due to changing intensity of solar radiation within the seasonal change or climate change.

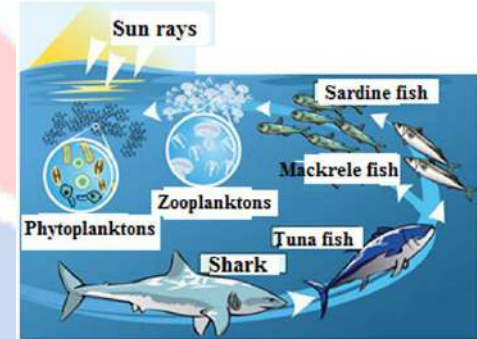
46) Fish tank whose base area is 640 cm^2 containing water of weight 1280 N . What is the value of water pressure on the bottom of the tank in pascal?

47) "In an aquatic ecosystem, the balance between organisms is greatly affected by interactions between elements of the food chain. If a type of predator species becomes extinct due to pollution..." Based on your studies, propose three solutions to compensate the loss of this species while ensuring the long-term sustainability of the aquatic system.

48) Natural reserves are among the most important means of maintaining the ecological balance of different environments. For example, there is the Ras Muhammad Natural Reserve in South Sinai. Explain the role of these nature reserves in maintaining ecological balance.

49) In the opposite figure:

- What do you expect to happen if another predator is introduced in addition to the existing predator in this food chain?
- Explain your answer.
- What is the relationship between increased environmental pollution and the ecological balance in this marine food chain?



50) Humans play a dual role in the ecological balance of marine ecosystems. Explain.

51) Look at this picture and answer:

- What is the name of this phenomenon?
- Where do you can see it?
- Explain why it happen?



52) If the temperature at the bottom of a mountain is 20°C, find the temperature at its top of height 4000 m above its bottom.

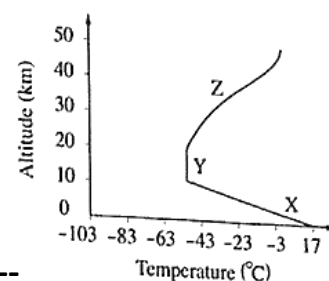
53) Calculate the height of a mountain if the temperature at its base is 30°C, and at the top = -2.5°C.

54) Explain with examples how the biological processes performed by living organisms and geological phenomenon cause a change in the percentages of the atmospheric components continuously.

55) The opposite graph shows the change in temperature with altitude above Earth's surface in the atmosphere:

(a) What is the reason for the gradual decrease in temperature in region X?

(b) Why is region Y preferred for aircraft flights?



(c) Why does the temperature gradually increase in region Z? -----

56) Rearrange in ascending order the atmospheric layers according to:

(a) The altitude above the Earth's surface. -----

(b) The thickness. -----

57) Mention at least one use for UV rays in:

a) Medical field. -----

b) Banknotes field. -----

58) Mention the negative effects of UV rays on:

a) Eyes. -----

b) Immune system. -----

59) How does ozone in the troposphere negatively affect plants?

60) Explain the steps of ozone formation in the stratosphere, writing the chemical equations.

61) Mention two actions that can be taken to reduce ozone layer depletion.

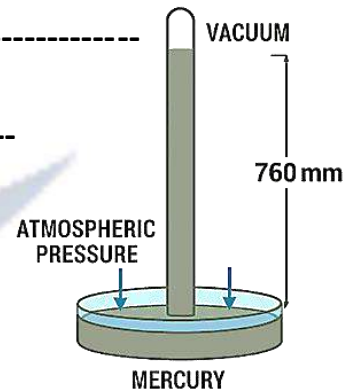
62) The figure shows a scientific instrument:

First: What is the name of the instrument? -----

Second: What is it used for? -----

Third: What does the height shown in the diagram (760 mm) represent?

Explain your answer. -----



63) If the temperature of a body is 20°C , what is the equivalent temperature on:

First: The absolute scale. -----

Second: The Fahrenheit scale. -----

64) The opposite figure shows a bird flying without flapping its wings:

(a) What technique does the bird use to stay in the air for long periods of time without constantly flapping its wings? -----

(b) What is the name of the currents that the bird floats on to maintain its altitude? -----



65) Write two factors affecting the humidity level with an explanation of the effect of one of them.

66) Global warming has some negative effects as it causes some natural disasters. Explain this.

Question 1: Choose the correct answer from the following:

**Chapter 1:
Lesson 1:**

1. Which of the following doesn't represent an ecosystem?

- a) The great desert. **c) Atmosphere.** b) Amazon rainforest d) Salty lakes

2. All the following from the abiotic factors in an environment EXCEPT.....

- a) Air b) Water c) Soil **d) Human**

3. It is where living organisms are found on, above, and below the Earth's surface.

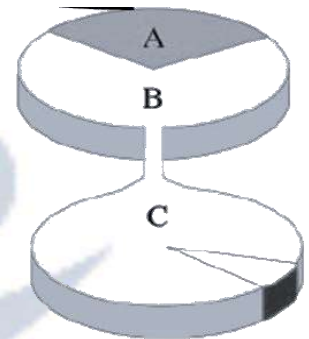
- a) Lithosphere **b) Biosphere** c) Atmosphere d) Hydrosphere

4. It is a blanket of gases that surrounds Earth. It is held near the surface of the planet by Earth's gravitational attraction.

- a) Lithosphere b) Biosphere **c) Atmosphere** d) Hydrosphere

5. The figure shows the percentage of the distribution of lithosphere and hydrosphere on Earth. Which of the following is correct?

	A	B	C
A	Lithosphere	Hydrosphere	Fresh water
B	Lithosphere	Fresh water	Salt water
C	Fresh water	Lithosphere	Salt water
D	Lithosphere	Hydrosphere	Salt water



6. Water covers about from Earth 's surface.

- A. 50 % B. 60 % **C. 70 %** D. 80

7. The percentage of fresh liquid water is about from all water shapes on Earth.

- A. 1 %** B. 30 % C. 70 % D. 97 %

8. Which of the following represents the greatest source of water on Earth's surface?

- (a) Oceans** (b) ground water (c) Fresh lakes (d) Frozen rivers

9. The ratio between: The fresh liquid water and the frozen fresh water on Earth is equal to.....

- (a) 1\2** (b) 2\1 (c) 3\1 (d) 1\1

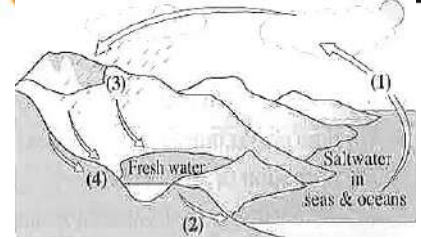
10. Which of the following is not related to the hydrological cycle in nature?

- (a) water movement through many pathways **(c) keeping the stability of Earth's surface**
(b) living organisms have essential role in it (d) is nearly a close system

11. The opposite figure illustrates some processes in the water cycle in nature:

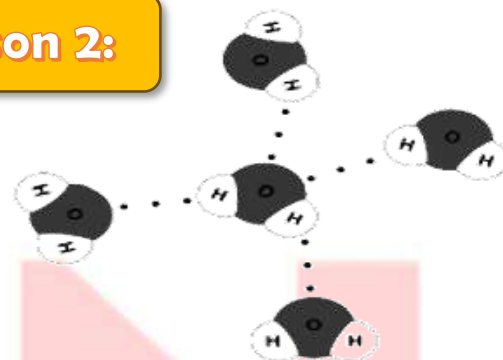
(a) Which of the following processes directly precedes the condensation process?

- a) 1** b) 2 c) 3 d) 4



- b) Which of the following processes doesn't occur by the effect of gravity?
a) 1 b) 2 c) 3 d) 4
12. Which of the following processes, if stopped, would directly disrupt the water cycle on the Earth's surface and in the atmosphere?
(a) Surface runoff (b) Evaporation (c) Soil infiltration (d) Transpiration
13. Which of the following processes may be a direct source of groundwater?
a) Water evaporation. b) Respiration in human c) Transpiration in plants d) infiltration
14. How does water return directly from land to oceans?
a. By evaporation b. By flowing c. by condensation d. by volatility
15. What is the process that occurs to the output of (a consequence for) transpiration during the hydrological cycle?
a. evaporation . b. condensation . c falling. d. infiltration
16. Stomata are present in.....
a. roots. b. leaves c. flowers. d. fruits
17. An increase in the rate of transpiration indirectly affects the water cycle in nature through
(a) Reducing rainfall (c) Reducing the rate of evaporation from water surfaces
(b) Fixing CO₂ in leaves (d) Increasing water vapor in the atmosphere
18. From the importance of the transpiration for the plants:
a) increasing the temperature of the plants
(b) increasing the percentage of CO₂
(c) helping in rising salts and water to upper parts .
(d) decreasing the ability of the plants in rising salts and water to upper parts .
19. Which of the following is not from the nitrogenous wastes?
(a) Ammonia (b) Nitrogen gas (c) Urea (d) Uric acid
20. Which of the following processes doesn't result in increasing the percentage of water vapor in the atmosphere?
a) A transpiration in plants. c) Animals respiration.
(b) Water infiltration through sedimentary rocks. d) Seawater evaporation.
21. Which of the following factors doesn't affect the transpiration process?
a) Number of plant leaves. c) Number of flowers and fruits.
b) Soil humidity. d) Atmospheric temperature
22. In which of the following periods of time, the rate of transpiration increase during the day?
a) At early morning. b) At noon. c) At sunset. d) At evening

Lesson 2:



23. In the opposite figure what is the type of bond?

choice	In the water molecule	between water molecules
A	Covalent	Hydrogen
B	Covalent	Covalent
C	Hydrogen	Covalent
D	Hydrogen	Hydrogen

24. Which of the following expressions is correct in a water molecule?

- A. the percentage of Hydrogen mass is 66.67%
 B. the percentage of Oxygen mass is 33.33%
 C. the percentage of Hydrogen mass is 11.11%
 D. the percentage of Oxygen mass is 66.67%

25. What is the mass ratio of hydrogen to oxygen, respectively, in a water molecule?

- a) 1\8
 b) 1\9
 c) 2\1
 d) 8\9

26. All of the following are consequences of the polarity of the water molecule except:

- A. Water molecules are linked together by hydrogen bonds.
 B. The ability to dissolve many mineral salts.
 C. The boiling point of water rises to 100 C
 D. The ability to dissolve a non-polar organic compound.

27. The hydrolysis of ammonium chloride:

	Hydrogen ions concentration	Hydroxyl ions concentration	The relation between (H^+) , (OH^-)	pH	The acid type	The base type
A	decreases	decreases	$[H^+] < [OH^-]$	More 7	weak	weak
B	doesn't change	doesn't change	$[H^+] = [OH^-]$	Equal to 7	strong	strong
C	increases	decreases	$[H^+] > [OH^-]$	Less 7	strong	weak
D	decreases	increases	$[H^+] < [OH^-]$	More 7	weak	strong

28. The hydrolysis of ammonium bicarbonate:

	Hydrogen ions concentration	Hydroxide ions concentration	The relation between (H^+) , (OH^-)	pH	The acid type	The base type
A	decreases	decreases	$[H^+] < [OH^-]$	More 7	weak	weak
B	doesn't change	doesn't change	$[H^+] = [OH^-]$	Equal to 7	weak	weak
C	increases	decreases	$[H^+] > [OH^-]$	Less 7	strong	weak
D	decreases	increases	$[H^+] < [OH^-]$	More 7	weak	strong

29. The following chemical equation represents the hydrolysis of the salt (WZ):



Which of the following represents the pH value of the solution?

- A. 8
 B. 7
 C. 6
 D. 5

30. Which of the following is not from the properties of water that support life?

- a) Dissolving many chemical compounds. c) Passing the waste to outside the cell.
b) Passing required substances to inside the cell. d) The difference in the mass of its elements

31. Water resembles hydrogen sulfide in.....

- a) molecular mas. c) the boiling point
b) the presence of hydrogen bonds d) the molecular structure

32. At normal atmospheric pressure, the boiling point of pure water (H_2O) is greater than that of hydrogen sulfide (H_2S) by

- a) $100^{\circ}C$ b) $-61^{\circ}C$ c) $39^{\circ}C$ d) $161^{\circ}C$

33. Which of the following solutions has the highest pH value?

- a) Ammonium bicarbonate solution. c) Acetic acid solution.
b) Potassium bicarbonate solution. d) Nitric acid solution

34. The ratio between (H^+) ions concentration in an acidic solution to their concentration in an alkaline solution is.....

- a) greater than 1 b) equals 1 c) less than 1 d) equals 7

35. On diluting a concentrated hydrochloric acid HCl, the pH value increases as a result of

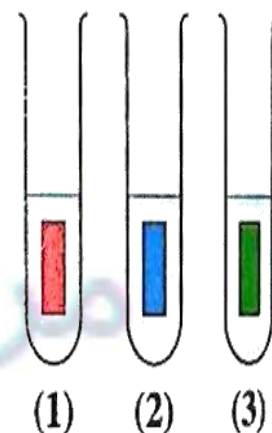
- a) increasing the concentration of Cl^- ions c) increasing the concentration of H^+ ions
b) decreasing the concentration of Cl^- ions d) decreasing the concentration of H^+ ions

36. The patient who suffers from severe stomach acid secretion (stomach acid reflux) is advised to.....

- a) Use a suitable treatment that decreases the pH value
b) Use a suitable treatment that increases the pH value
c) Eat food that increases the (H^+) ion concentration
d) Drink soda that contains a percentage of CO_2

37. Three pH test strips were immersed in three solutions (1), (2) and (3), as in the opposite figure. Which of the following choices is correct?

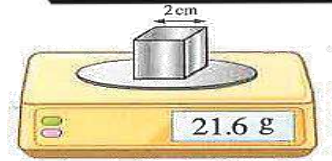
	Solution (1)	Solution (2)	Solution (3)
a)	Ammonium chloride	Sodium bicarbonate	Sodium chloride
b)	Sodium chloride	Ammonium chloride	Sodium bicarbonate
c)	Sodium bicarbonate	Sodium chloride	Ammonium chloride
d)	Sodium chloride	Sodium bicarbonate	Ammonium chloride



Lesson 3:

38. The density of water is equal to $1g/cm^3$ at a temperature $4^{\circ}C$, then the mass of $4 m^3$ of water is equal

- A. 0.004 kg B. 1 kg C. 4 kg D. 4000 kg

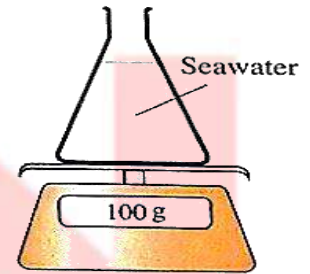


39. The opposite figure shows a solid cube with a side length of 2 cm. When placed on a balance, the balance reading was 21.6 g, so the density of the cube material is.....

- a) 2700 kg/m³ b) 3600 kg/m³ c) 5400 kg/m³ d) 10800 kg/m³

40. A flask containing a sample of seawater was placed on the pan of a balance. The reading of the balance for the water and the flask together was 100 g, as shown in the figure. Knowing that the density of seawater is 1030 kg/m³, what is the volume of the sample?

- a) Greater than 97 cm³ c) Less than 97 cm³
b) Equal to 97 cm³ d) Cannot be determined



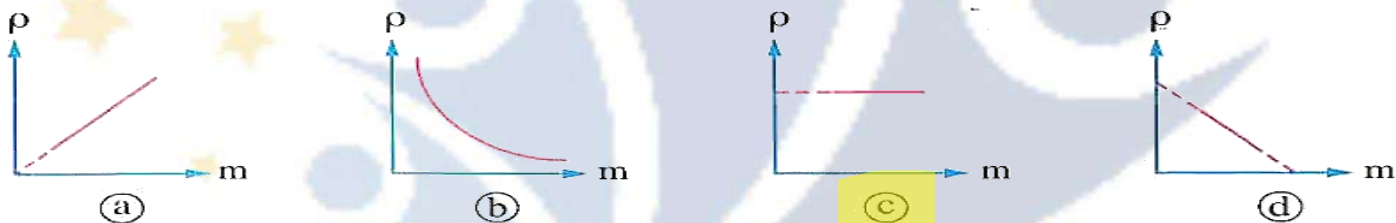
41. Two solid cylinders are made of the same metal and have the same diameter, one of them is longer than the other at the same temperature, so both cylinders have the same.....

- a) mass b) density c) volume d) weight

42. Liquid at a specific temperature was poured into a cylindrical container until its level reached the middle of the container. The density of the liquid was (ρ), if more of the same liquid is poured at the same temperature to completely fill the container, the density of the liquid will be equal to.....

- a) $\frac{1}{2}\rho$ b) 2ρ c) $\frac{3}{2}\rho$ d) ρ

43. The graph that represents the relationship between the density (ρ) of pure water and the mass (m) of samples from it at a temperature of 50°C is.....



44. The maximum density of pure water at a temperature of

- a) 0 °C b) 4 K c) 90 °C d) 277 K

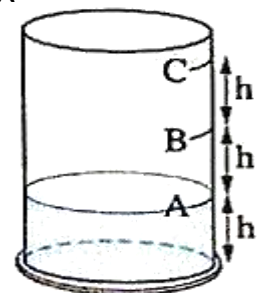
45. The figure shows three cups of water of different salinities, at the same temperature. An egg is placed in each of them (and the eggs are completely identical). The arrangement of the water according to density is:



- A. $X = Y = Z$ B. $X > Y > Z$ C. $Z > Y > X$ D. $Z > Y = X$

46. The opposite figure shows a container containing an amount of liquid. If an amount of liquid Y of relative density 1 is added to the container with a mass m and does not mix with the first liquid, the surface level of liquid Y will settle.....

- a) at level B c) between levels A and B
b) at level C d) between levels B and C



47. The relative density of seawater is 1.025, this means that the density of seawater is equal to:

	In g/cm ³	In kg/m ³
A	1.025	1.025
B	1025	1025
C	1.025	1025
D	1025	1.025

48. Given that the relative density of mercury is higher than the relative density of alcohol at the same temperature, then the ratio of the mass of 1 cm³ of mercury to the mass of the same volume of alcohol is
a) greater than 1 b) less than 1 c) equal to 1 d) indeterminable

49. The density of water is equal to 1g/cm³ at temperature 4 °C, when the temperature is raised to 8 °C the:

	The water volume	The water density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

50. Four samples of water each have a mass of 1 Kg, which one has a larger volume:
A. Saltwater at 4°C B. Saltwater at 8°C C. Fresh water at 4°C D. Fresh water at 8°C

51. Which of the following devices is used to measure the density of liquids?
A. Hydrometer B. Barometer C. Manometer D. Thermometer

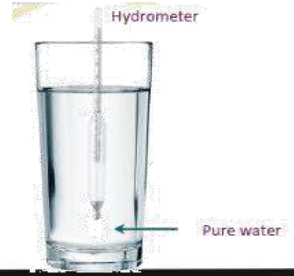
52. In the hydrometer scale:
A. The lower scale indicates zero density C. The lower scale indicates the lowest density
B. The upper scale indicates zero D. The upper scale indicates the lowest density

53. In a hydrometer, which of the following materials can be used to help balance:
A. Mercury or lead balls. B. Nickel or chromium. C. Platinum or iridium. d. Bronze or phosphorus.

54. In the hydrometer:

	The function of wide cavity	The function of mercury
A	Floating	vertical balance
B	Floating	Floating
C	vertical balance	Floating
D	vertical balance	vertical balance

55. In the diagram shown, when a large amount of salt is dissolved in the pure water; the volume of the immersed part of the hydrometer in the water.....
A. increases B. decreases C. doesn't change D. cannot be determined



56. Both volume of water and density of water change with temperature What happens during each procedure described below?

0 °C ← 4 °C 4 °C ← 23 °C

	The water volume	The water density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

	The water volume	The water density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

0 °C → 8 °C

	The water volume	The water density
A	increases	decreases
B	decreases	increases
C	decreases then increases	increases then decreases
D	increases then decreases	decreases then increases

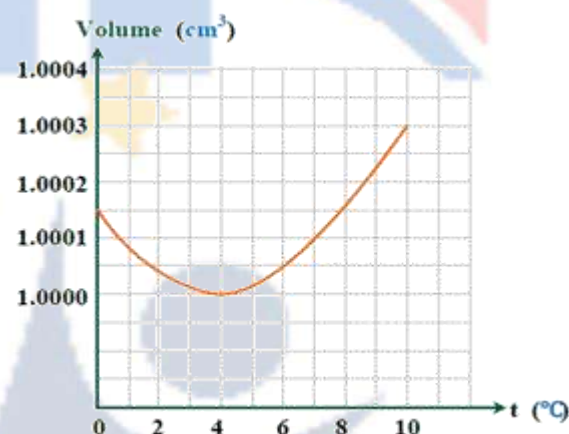
57. From the graph shown, we can conclude that:

A. The density of water increases when the temperature is raised above 4 °C

B. The density of water increases when the temperature is lowered below 4 °C

C. The volume of water increases when the temperature is lowered below 4 °C

D. The volume of water decreases when the temperature is lowered below 4 °C



58. Ocean currents transport:

A. Heat from the poles to the tropics.

B. Salt from the poles to the tropics

C. Nutrients from the ocean bottom to the surface.

D. Nutrients from the ocean surface to the bottom.

59. The direction in which ocean currents move.....

	Heat and salts	Nutrients
A	From the poles to the equator	From the ocean surface to the bottom
B	From the poles to the equator	From the bottom of the ocean to the surface
C	From the equator to the poles	From the bottom of the ocean to the surface
D	From the equator to the poles	From the ocean surface to the bottom

60. In ocean depths, where pressure is very high, how does the enormous increase in pressure affect the density of water in large depths compared to its density at the surface?

a) The increase in pressure has no effect on density because water is completely incompressible.

b) The density increases, but this effect is completely overcome by the decrease in temperature at the bottom.

c) The density decreases because the high pressure breaks the hydrogen bonds.

d) Density increases slightly due to the compression of water under pressure.

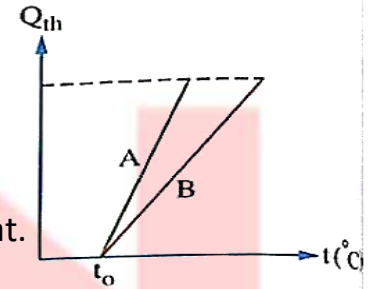
- 61.** When the melting glaciers enter the ocean water, they.....
 a) mix because each is a liquid, water, with the same density.
 b) Don't mix, and the salty water floats on the surface of the fresh water.
 c) Don't mix, and the fresh water floats on the surface of the salty water.
 d) mix because they are two liquids with different densities
- 62.** What is the fundamental relationship between increasing salinity and the density of liquid water at constant temperature and pressure?
 (a) The density increases because adding salts increases the total mass per unit Volume.
 (b) The density increases because the specific heat of the solution decreases.
 (C) The density decreases as the dissolved ions between water molecules increase volume.
 (d) The density remains constant because the mass of dissolved salts are compensated by a similar decrease in the volume of water.
- 63.** Which pair of the following physical quantities have the same unit of measurement?
 a) Amount of heat and temperature.
 b) Specific heat and temperature.
 c) Amount of heat and internal energy.
 d) Internal energy and temperature
- 64.** Which of the following statements most accurately represents the definition of heat (Q) accurately?
 (a) The transfer of energy across a system boundary due to a temperature difference.
 (b) The state of matter from hotness and coldness.
 (C) The average latent energy stored in the molecular bonds of a substance.
 (d) The total thermal energy contained within a system's boundaries.
- 65.** The average of kinetic energy of water molecules is the largest at
 a) Zero °C
 b) 50 °C
 c) 80 °C
 d) 100 °C
- 66.** The system international measuring unit of temperature is
 A. degree Celsius (°C) B. degree Fahrenheit (°F) C. Kelvin (K) D. Rankine (°R)
- 67.** The freezing point of pure water is
 a) -273 k
 b) 273 °C
 c) 0 k
 d) 273 k
- 68.** The absolute zero is equal to.....
 a) 0 k
 b) 273 K
 c) 0 °C
 d) 273 °C
- 69.** Two equal masses from different metals (A) and (B) are heated by the same amount of heat; the temperature of (A) increased by 50°C while the temperature of metal (B) increased by 150°C. If the specific heat of (A) = 390 J/kg. °C, then the specific heat of (B) =.....
 (a) 130 J/kg. °C
 (b) 260 J/kg. °C
 (C) 390 J/kg. °C
 (d) 520 J/kg. °C
- 70.** If you know that the specific heat of glass is 840J/ Kg.°C, it is equivalent to
 a) 3.08 J/Kg.K
 b) 567 J/Kg.K
 c) 840 J/Kg.K
 d) 1113 J/Kg.K

71. Which of the following affects the specific heat of the substance?

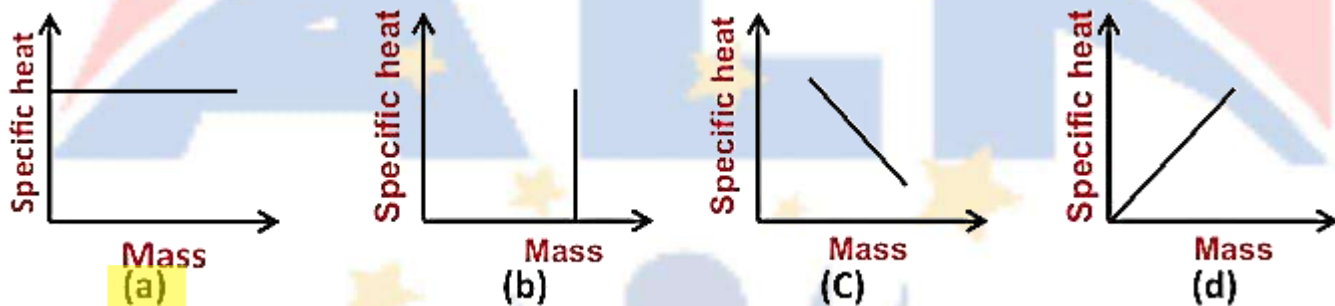
- (a) Its physical state (c) Its volume
(b) Its mass (d) Quantity of heat lost or gained

72. Two quantities of two liquids A and B with the same mass were heated from a temperature t_0 and the opposite graph represents the relationship between the amount of heat (Q) absorbed by each liquid and its temperature (t), so which liquid has a higher specific heat?

- a) Liquid A. c) The two liquids have the same specific heat.
b) Liquid B. d) The answer cannot be determined



73. Which of the following graphs represents the correct relation between mass of substance and its specific heat.....



74. Two solid bodies, (1) and (2), made of the same material with masses m_1 and m_2 , respectively, if each of them has absorbed an amount of heat Q so that their temperatures have increased by 5°C and 10°C respectively, the ratio of their masses $m_1 \setminus m_2$ is

- a) $1 \setminus 2$ b) $1 \setminus 1$ c) $2 \setminus 1$ d) $4 \setminus 1$

75. The following data table shows the change in temperature of equal masses of different materials (Δt) when each one gains the same amount of heat.

Substance	The change in its temperature at gaining the same amount of heat
W	5°C
X	10°C
Y	15°C
Z	20°C

Which substance W, X, Y or Z has the largest specific heat?

- a) Substance W b) Substance X c) Substance Y d) Substance

76. Which causes more severe skin burns, being exposed to water vapor of 100°C or being exposed to liquid water at the same temperature? (Where: the skin is exposed to the same amount of water and water vapor for the same interval of time).

- a) Liquid water due to its high specific heat.
b) Liquid water due to the high amount of heat it emits during boiling.
c) Water vapor due to its low specific heat.
d) Water vapor due to the high amount of heat it emits at condensation

77. Two equal masses of liquids (a) and (b) of specific heat capacities c_a and c_b respectively, are miscible but don't react together. The temperatures of the two liquids were 80°C and 10°C , respectively. If the two liquids are mixed to reach thermal equilibrium at a final temperature of 30°C , the ratio (c_a/c_b) is equal.....

- a) $1/3$ b) $3/1$ c) $2/5$ d) $5/2$

78. An insulated aluminum container of mass 20 g contains 150 g of water at a temperature of 20°C . A piece of a metal of mass 96 g and temperature 100°C is dropped into water. If the final temperature of the system is 25°C and the specific heat capacities of water and aluminum are 4200 J/kg.K and 900 J/kg.K , respectively, then the specific heat capacity of the metal of the dropped piece equals.....

- (a) 450 J/kg. K (b) 710 J/kg. K (C) 960 J/kg. K (d) 1440 J/kg. K

79. Which group of organisms listed below are Poikilotherms (cold-blooded)?

- (a) Birds and Mammals. (C) Humans and Whales.
(b) Fish, Amphibians, and Reptiles. (d) Only Arthropods.

80. The concept "latent" refers to

- (a) The heat is only absorbed when the substance is impure.
(b) The heat is hidden because it causes a significant change in pressure.
(C) The heat is absorbed or released without a change in temperature ($\Delta T=0$).
(d) The heat can only be measured using an indirect method

Lesson 4:

81. Colligative properties of a solution...

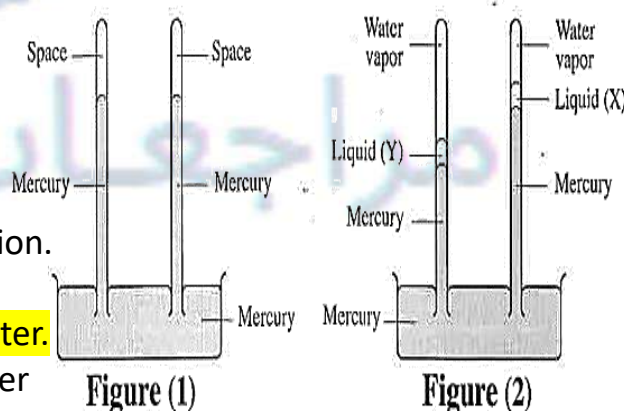
- a) Depend only on the type of solute. c) Depend on the type and concentration of the solute.
b) Depend only on the type of solvent. d) Depend on the concentration of solute, not its type.

82. What does the term " the concentration of solution " express?

- a) Total volume of solution c) Amount of solute in a given volume of solvent
b) Type of solute and solvent d) Temperature of the solution

83. In the two opposite figures, two equal volumes of liquids (X) and (Y) were put in the two tubes of the apparatus illustrated in figure (1) each separately. So, the mercury level in the two tubes decreases as in figure (2), which of the following is correct?

- a) (X) represents distilled water / (Y) represents NaCl solution.
b) represents river water / (Y) represents seawater.
c) (X) represents NaCl solution / (Y) represents distilled water.
d) (X) represents distilled water / (Y) represents ocean water



84. What is the relationship between the number of solute molecules in a solution and its vapor pressure?

- A) Inverse relationship. C) No relationship.
B) Direct relationship. D) Variable relationship.

85. Why are water molecules less likely to evaporate in solutions than in pure water?

- A) Because of the attractive forces between water molecules increases
- B) Because of the attractive forces between water molecules decreases
- C) Because of the attractive forces between water molecules and the solute increases**
- D) Because of the attractive forces between water molecules and the solute decreases

86. Which of the following factors doesn't affect the boiling point of solution?

- a. Volume of solution**
- b. Density of solution
- c. Atmospheric pressure
- d. Concentration of solution

87. When a water sample is left exposed to the atmospheric air, then part of water is evaporated, so its boiling point

- A- decreases
- B- becomes zero
- C- increases**
- D- does not change

88. What is the effect of increasing the number of solute molecules in solution on the boiling point of the solution and its density?.

	On the boiling point	On the density
A	increases	increases
B	decreases	decreases
C	decreases	increases
D	increases	decreases

89. When comparing between two equal concentrations of $\text{Al}_2(\text{SO}_4)_3$ and $\text{Al}(\text{NO}_3)_3$ solutions, the boiling point and vapor pressure of aluminum sulphate solution according to aluminum nitrate solution areand..... respectively.

- a) lower - higher
- b) higher - lower**
- c) higher - higher
- d) lower - lower

90. On measuring the boiling point of three identical samples of table salt solution:

T 1	Represents the boiling point of the solution at standard atmospheric pressure.
T 2	Represents the boiling point of the solution at the top of a high mountain.
T 3	Represents the boiling point of the solution inside a pressure cooking pot

Which of the following relations is correct?

- a) $T_1 > T_2 > T_3$
- b) $T_3 > T_2 > T_1$
- c) $T_2 > T_1 > T_3$
- d) $T_3 > T_1 > T_2$**

91. The decrease in freezing point isproportional to number of solute particles, while increase in boiling point is proportional to solution concentration.

- A- direct / direct**
- B- direct /inversely
- C- inversely / inversely
- D- inversely / direct

92. Three aqueous solutions of equal volume X, Y, and Z, each containing different amounts of sodium chloride, as shown in the opposite table. The correct order of the freezing points of T_x , T_y , and T_z is

Solution	The amount of dissolved table salt
X	50 g
Y	10 g
Z	80 g

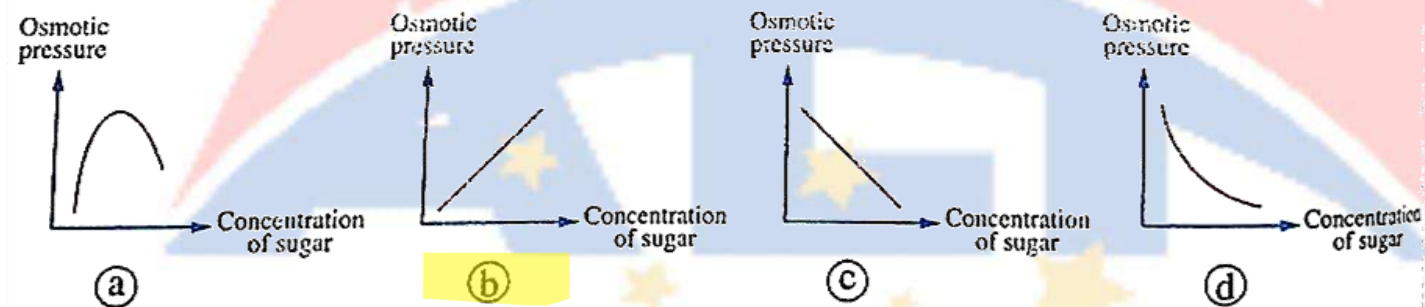
- a) $T_x > T_y > T_z$
- b) $T_x = T_y = T_z$
- c) $T_y > T_x > T_z$**
- d) $T_y < T_x < T_z$

- 93.** On adding 50 mL pure water to 100 mL salt solution, then
- The boiling point of the solution decreases and its vapor pressure decreases
 - The freezing point of the solution decreases and its boiling point increases
 - The vapor pressure of the solution increases and its osmotic pressure increases.
 - The freezing point of the solution increases and its vapor pressure increases

94. As the freezing point of a solution increases, its osmotic pressure...

- A- increases B- decreases C- does not change D- becomes zero

95. Which of the following graphs illustrates the relationship between the concentration of sugar in a sugary solution and its osmotic pressure?



96. Which of the following represents a correct arrangement for the osmotic pressure of three water samples from different sources at 25°C?

- Fresh water > Distilled water > Salt water.
- Fresh water = Distilled water > Salt water.
- Salt water > Fresh water > Distilled water.
- Salt water > Fresh water = Distilled water

97. Two liquids X and Y are separated by a semipermeable membrane. If the boiling point of X > boiling point of Y, then water...

- moves from liquid X to liquid Y.
- remains stationary in both liquids.
- moves from liquid Y to liquid X.
- moves between both liquids at the same rate

Lesson 5:

98. All the following from the reasons that make "water is essential for life" except.....

- The vital activities in all living cells depend on the water properties.
- It is the most abundant chemical substance in living organisms.
- It is present in almost all chemical reactions occurring in vital activities.
- Water is found inside the cells only.

99. Which of the following correctly describe eukaryotes?

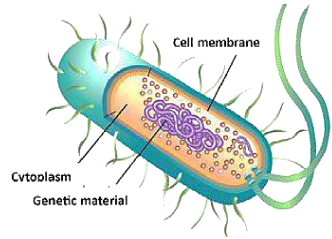
- They are unicellular organisms only
- Their cell contains a nucleus surrounded by a membrane, and specialized organelles
- Their genetic material is not surrounded by a nuclear membrane
- They are multicellular organisms only

100. From your study of prokaryotes and eukaryotes, determine: Which of the following is present in all prokaryotes and all eukaryotes?

- Cellulose
- Nucleus
- Genetic material
- Plastids

101. The shown figure represents cell whose cell wall contains

- a) Bacterial\chitin
- b) Bacterial\peptidoglycan
- c) Fungal\ chitin
- d) Fungal\peptidoglycan



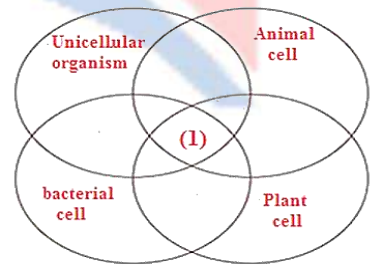
102. Which of the following correctly describe the structure of cell wall in both fungal cell and plant cell?

	In fungal cell	In plant cell
A	chitin	chitin
B	cellulose	cellulose
C	cellulose	chitin
D	chitin	cellulose

103. Which of the following organisms belongs to the coelenterates?

- a) Jellyfish.
- b) Starfish.
- c) Sponge.
- d) Clam

104. Study the schematic diagram opposite, which shows the components of the fine structure of the cells of four different organisms, then determine: Which component is represented by the number (1)?



- a) Cell membrane
- b) Chloroplast
- c) Cellulose wall
- d) Peptidoglycan

105. Which of the following are common between plant cells, fungi, and bacteria?

- a) Cell wall and plasma membrane.
- b) Cell wall and sap vacuoles.
- c) Mitochondria and chloroplasts.
- d) Sap vacuoles and chloroplasts.

106. Which of the following structures in a living cell performs the function of the person shown in the picture?



- a) Cell wall
- b) Mitochondria
- c) Nucleus
- d) Plasma membrane

107. The organelle that controls the cell's activities and contains the genetic material that determines the organism's traits is.....

- a) sap vacuole
- b) mitochondria
- c) nucleus
- d) chloroplast

108. The figure shows the structure of a plant cell, First: Which organelle is not found in animal cell?

- a) Organelle w
- b) Organelle X
- c) Organelle Y
- d) Organelle Z

Second: Which organelle is responsible for the storage of food, water, and excess salts?

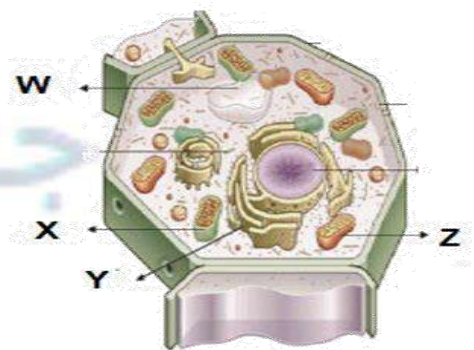
- a) Organelle W
- b) Organelle X
- c) Organelle Y
- d) Organelle Z

Third: Which organelle that contains chlorophyll substance and carry out photosynthesis process?

- a) Organelle w
- b) Organelle X
- c) Organelle Y
- d) Organelle Z

Forth: Which organelles that serve as energy-production centers in the cell?

- a) Organelle w
- b) Organelle X
- c) Organelle Y
- d) Organelle Z



Fifth: Which organelles that are a group of membranes used to transport various materials from one place to another inside the cell.?

- a) Organelle W b) Organelle X **c) Organelle Y** d) Organelle

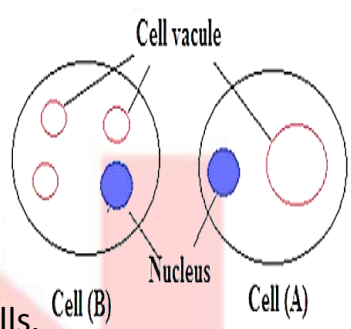
109. Plants differ from animals in all of the following except...

- a) The ability to move c) **Multicellular**
b) Type of nutrition d) The presence of cellulose

110. The figure represents two cells (A) and (B). Study it and then answer:

Which of the following is true regarding the types of cells?

- A. Cell (A) is animal, while cell (B) is plant. C. Both (A) and (B) are animal cells.
B. Cell (A) is plant, while cell (B) is animal. D. Both (A) and (B) are plant cells.



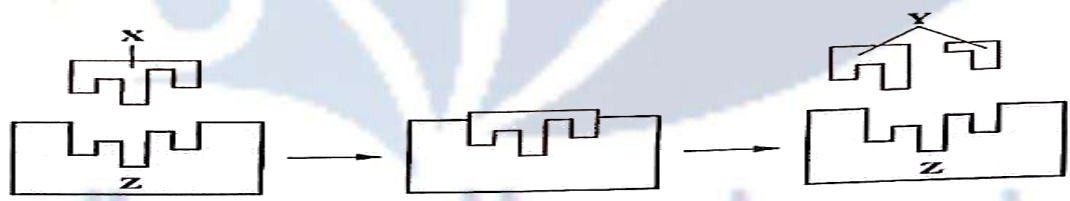
111. Which of the following correctly describe the percentage of water in mammals?

	Of the body mass	Inside cells	Outside cells
A	%٧٠	%٤٧	%٢٣
B	%٧٠	%٢٣	%٤٧
C	%٢٣	%٧٠	%٤٧
D	%٤٧	%٢٣	%٧٠

112. All the following are catabolic process except.....

- A) Synthesis of proteins** C) Breakdown of protein
B) Breakdown of carbohydrates D) Breakdown of glucose sugar

113. The following figures represent a model for the action mechanism of an enzyme inside the human body, which of the following represents letters (X), (Y) and (Z) respectively?

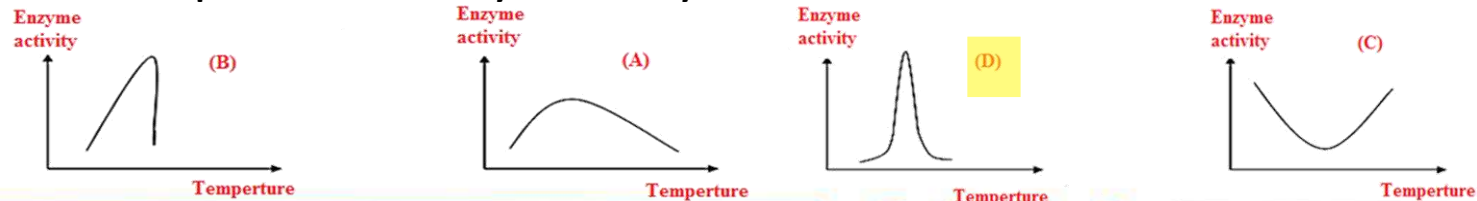


- a) Enzyme / Products / Substrate. c) Enzyme / Substrate / Products.
b) Substrate / Enzyme / Products. **d) Substrate / Products / Enzyme**

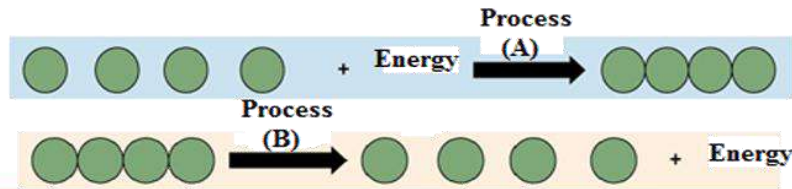
114. Which of the following factors directly slows down enzyme activity?

- a. Increasing the number of mitochondria c. Availability of "substrate" molecules in abundance
b. Raising the temperature above the optimal limit d. Increasing the size of the sap vacuole

115. If you know that enzyme (X) is sensitive to changes in temperature, which of the following curves represents the activity of this enzyme?

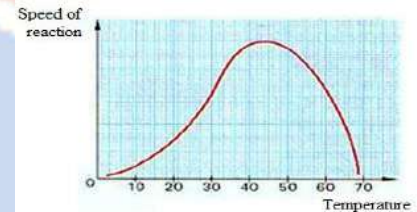


116. The opposite diagram represents vital processes occurring in a living organism. Study it and then determine:



- A. Process (A) occurs in the mitochondria, while process (B) occurs during muscle formation.
B. Process (B) occurs in the mitochondria, while process (A) occurs during muscle formation.
 C. Both (A) and (B) occur in the mitochondria.
 D. Both (A) and (B) occur during muscle formation.

117. The opposite curve shows the activity of an enzyme at different temperatures. Study the curve and determine which of the following is true for this enzyme?



- a) The reaction rate reaches its highest level at 5°C
 b) All enzyme molecules are consumed at 70°C
c) Enzyme activity is equal at 30°C and 60°C
 d) Enzyme activity is lowest at 45°C

Lesson 6:

118.It refers to the behavioral or physical traits of a living organism that help it to survive better in its ecosystem.

- a) transpiration. **b) adaptation.** c) respiration. d) excretion.

119. Ocean Bottom bony fish are structurally adapted by having...

- A. Swim bladder. B. Kidneys. C. A contractile vacuole. **D. Wide eyes.**

120. Icefish lives in the cold Southern Oceans at depths of up to approximately.....

- a) 2 km.** b) 20 km. c) 200 km. d) 2000 km.

121. The streamlined body, mucus, and scales in fish help reduce water resistance to their movement. This is considered a _____ adaptation.

- a) Behavioral. **c) Structural.** b) Functional. d) Osmotic.

122. Which of the following are characteristics of deep-sea fish?

	Eyes	Body shape
A	Wide	compressed
B	Wide	Flexible
C	Narrow	compressed
D	Narrow	Flexible

123. Which of the following distinguishes dolphins from ice – fish?

- A- Streamlined shape.** B- The presence of fins.
 C- The presence of gills. D- The presence of snorkels.

124. Which of the following organisms demonstrates a structural adaptation that distinguishes it from other species at the same taxonomic level?

- A. Tilapia. B. Salmon. C. Ice – fish. **D. Dolphins.**

125. Each of the following is considered a reason for performing the behavioral adaptation by living organisms, except.....

- a) avoiding the hardships. b) accomplishing the reproduction process.
c) better use of the available resource. **d) being able to breathe.**

126. The whales use their in communications, and hunt their preys.

- a) bodies colors. **b) sounds.** c) big eyes. d) fins.

127. Factors that lead to behavioral adaptation include...

- A. Oxygen deficiency. B. Water depth. **C. Reproduction.** D. Water resistance.

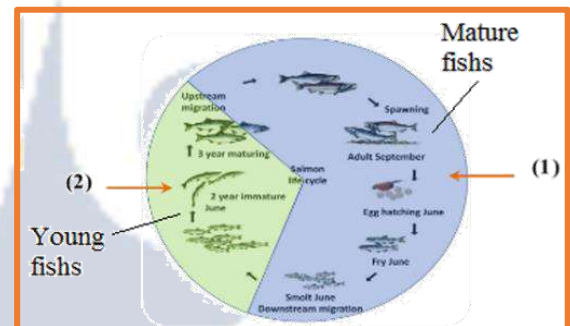
128. The opposite figure shows salmon fish migration, which is an adaptation.....

- A. Behavioral only.** B. Physiological only.
C. Behavioral and Physiological combined. D. Not considered an adaptation.



129. The figure shows the life cycle of salmon. Study it and then determine which of the following represents stages (1) and (2) indicated by the arrow?

	(1)	(2)
A	River	Sea
B	River	River
C	Sea	Sea
D	Sea	River



130. What is the environment in which each of the following occurs for salmon?

	The environment in which it is born	The environment in which it lives until sexual maturity	The reproductive environment
A	River	Sea	River
B	Sea	River	River
C	River	River	Sea
D	Sea	Sea	River

131. Which of the following is true about salmon?

- A. The osmotic pressure inside the cells of young fish is higher than the osmotic pressure of the surrounding medium.**
B. The osmotic pressure inside the cells of young fish is lower than the osmotic pressure of the surrounding medium.

- C. The osmotic pressure inside the cells of adult fish is higher than the osmotic pressure of the surrounding medium.
D. The osmotic pressure inside the cells of adult fish is equal to the osmotic pressure of the surrounding medium.

132. In salmon fish...

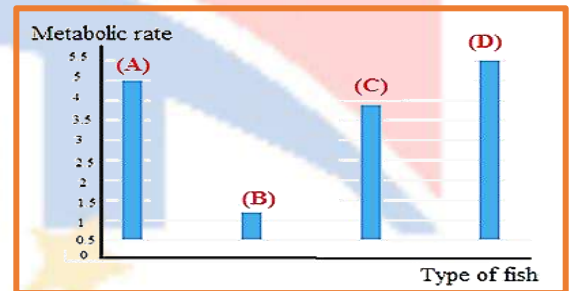
- A. Adult fish get rid of excess water. B- Adult fish get rid of excess salts.
C- Young fish swallow large amounts of water. D- Young fish get rid of excess salts.

133. What are types of adaptations that deep-depths fish use to adapt to high pressure of water?

- A) Structural only. B) Structural and physiological together.
c) Physiological only. D) Structural and behavioral together.

134. The graph represents the relation between some marine fish and the its metabolic rate, Study it and then determine: Could anyone choose to live in deep waters?

- a) (A).
b) (B).
c) (C).
d) (D).



135. Viper fish has high concentrations of hemoglobin in its blood to adapt to the.....

- a) lack of oxygen. b) high salinity. c) high pressure. d) darkness.

136. Which of the following is a physiological change in deep ocean fish?

- A. Compact body B. Strong arteries C. Slower metabolic rate D. Large gills

137. Which of the following distinguishes deep-sea fish in terms of the composition of their blood vessels?

- A- Strong and robust. B- Weak and thin. C- Strong and thin. D- Weak and thick.

138. Deep-sea fish withstand high pressure because.....

- a) they have flexible bodies and reduced air spaces. b) their bones are filled with air.
c) they use lungs to equalize pressure. d) they produce oxygen internally.

139. Among the adaptations of deep-sea fish: Adaptation (I): Strong arteries and veins.

Adaptation (II): Special abilities to regulate respiration under oxygen-deficient conditions.

In the following table, what type of adaptation are (I) and (II) respectively?

Choice	Adaptation (I)	Adaptation (II)
a	Physiological adaptation	Structural adaptation
b	Structural adaptation	Physiological adaptation
c	Physiological adaptation	Physiological adaptation
d	Structural adaptation	Structural adaptation

140. The osmotic pressure in the bodies of fresh water fish is:

- A. Low, causing them to lose water from their bodies.
- B. High, causing them to lose water from their bodies.
- C. Low, causing their bodies to gain water.
- D. High, causing their bodies to gain water.

141. Which of the following results from freshwater gardening (fish) is the elimination of excess body fluid?

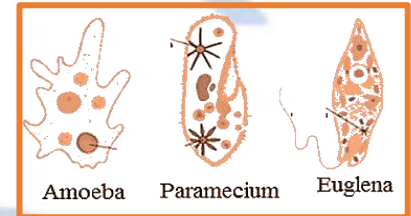
- A. The presence of a contractile system that helps expel excess water.
- B. The excess urine produced by the body is diluted.
- C. The blood contains a high percentage of urea.
- D. The presence of openings at the top of the head.

142. Unicellular organisms, such as amoeba, obtain oxygen and get rid of carbon dioxide through:

- A. The plasma membrane by diffusion.
- B. The contractile vacuole by diffusion.
- C. The plasma membrane by osmosis.
- D. The contractile vacuole by osmosis.

143. Amoeba, Paramecium, and Euglena are similar in.....

- A. They contain pseudopods (contractile vacuole) from the excess body.
- B. The osmotic pressure outside them is equal to pressure inside them.
- C. The osmotic pressure outside them is higher than inside them.
- D. They are multicellular organisms.



144. Amoeba adapted to low osmotic pressure. Which component performs each of the following?

	Collect excess water	Discharge excess water from the cell
A	Contractile vacuole	Plasma membrane
B	Plasma membrane	Plasma membrane
C	Plasma membrane	Contractile vacuole
D	Contractile vacuole	Contractile vacuole

145. Which of the following happens to an amoeba when its contractile vacuole is removed?

- A- The amoeba regulates its water needs naturally.
- B- The amoeba can easily get rid of excess water.
- C- The osmotic pressure inside it increases.
- D- The osmotic pressure inside it decreases.

146. The ratio between the osmotic pressure for fresh water to the osmotic pressure for the body fluids inside the living organisms that live in this water is.....

- a) greater than 1.
- b) less than 1.
- c) equal 1.
- d) equal zero.

147. A 10% saline solution and a 15% sugar solution are separated by a semi permeable membrane. What happens?

- A. Water moves from the saline solution to the sugar solution.
- B. Water moves from the sugar solution to the saline solution.
- C. Salt moves from the saline solution to the sugar solution.
- D. Salt moves from the sugar solution to the saline solution.

148. Which of the following expresses the correct arrangement for osmotic pressure?

- A. Fresh water < Solutions inside saltwater fish < Solutions inside freshwater fish < Seawater.
- B. Fresh water < Solutions inside freshwater fish < Solutions inside saltwater fish < Seawater.
- C. Seawater < Solutions inside freshwater fish < Solutions inside saltwater fish < Fresh water.
- D. Seawater < Solutions inside saltwater fish < Solutions inside freshwater fish < Fresh water.

149. Fish that live in salt water...

- A. The osmotic pressure outside them is lower than inside them.
- B. Water moves from their bodies to the outside.
- C. They get rid of excess water through the contractile vacuole.
- D. The osmotic pressure inside them is lower than outside them.

150. Sea fish facing water salinity by:

- A. Swallowing large quantities of water, controlling blood urea levels.
- B. The kidneys, where excess salts are eliminated in the form of dilute urine.
- C. The contractile vacuole.
- D. Large gills.

151. Osmotic adaptation of adult salmon allows them to:

- A. Moving from fresh water to salt water
- B. Moving from salt water to fresh
- C. Remaining in salt water
- D. Remaining in fresh water

Lesson 7:

152. The mass of a gas that should be dissolved to a cup of pure water to form solution of volume 0.25 L, so that the solubility is 35 mg/L is equal to....

- A- 8.75 mg.
- B- 17.5 mg.
- C- 25 mg.
- D- 70 mg.

153. If we have two identical water tanks — one with fresh water and one with salt water at the same temperature, both aerated equally — in which tank will dissolved oxygen be higher?

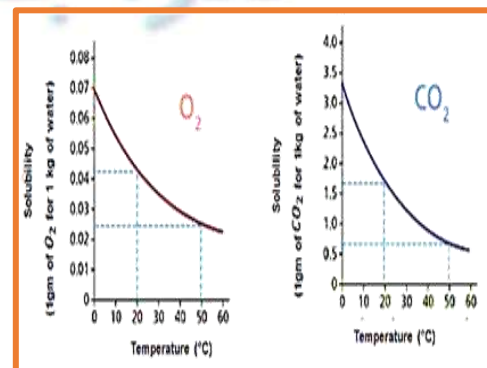
- A- In salt water, because salt promotes oxygen solubility.
- B- In fresh water, because gas solubility decreases with increasing salinity.
- C- Equal concentration in both tanks.
- D- Cannot be determined without knowing air pressure.

154. The ratio between the concentration of each of carbon dioxide and oxygen gases in the atmospheric air equalsapproximately.

- A. 500.
- B. 0.05.
- C. 0.03.
- D. 0.002.

155. Analyze the two graphs shown From the figures, through the temperature range (20°C – 50°C), it is clear that by increasing the temperature, the:

- A. O₂ solubility decreases at a greater rate than CO₂ solubility.
- B. The solubility of CO₂ decreases at a greater rate the solubility of O₂.
- C. The solubility of both O₂, CO₂ decreases at the same rate.
- D. The solubility of O₂, CO₂ is increasing at the same rate.



156. from the previous figure: when increasing the temperature,.....

	Solubility of O ₂	Solubility of CO ₂
A	Decreases	Increases
B	Increases	Decreases
C	Decreases	Decreases
D	Increases	Increases

157. The relationship between water temperature and the solubility of carbon dioxide is:

- A. Direct. B. Inverse. C. Constant. D. No relationship.

158. In an artificial lake, a massive fish kill was observed on a very hot sunny day. What is the most likely scientific explanation?

- A. A large increase in photosynthesis caused water toxicity.
B. A sharp decrease in dissolved oxygen due to high temperature.
C. A high decrease in pH of water. D. An increase in salinity due to evaporation.

159. In cold regions, water is richer in dissolved oxygen compared to tropical warm regions. What is the biological result of this difference?

- A. Marine organisms in cold regions are smaller in size.
B. Biodiversity is higher in cold regions.
C. Cold regions support larger and more active marine life.
D. There is no significant biological difference.

160. Some fish, like salmon, migrate to cold, oxygen-rich river sources to lay its eggs. Why?

- A. To avoid predators in warmer waters.
B. Because cold water provides higher dissolved oxygen levels essential for developing young fish.
C. Because food is more abundant in those regions.
D. Because water salinity is lower in river sources.

161. Which of the following choices expresses the correct arrangement for the solubility rate of oxygen gas in some water bodies?

- a) Fresh water at 20°C > salt water at 20°C > salt water at 5°C.
b) Salt water at 20°C > salt water at 5°C > fresh water at 20°C.
c) Fresh water at 5°C > salt water at 5°C > salt water at 20°C.
d) Salt water at 20°C > fresh water at 20°C > salt water at 5°C.

162. All of the following are considered sources of dissolved oxygen in water, except.....

- a) algae. b) atmospheric air. c) phytoplankton. d) zooplankton.

163. A dense fish farm was established in a closed pond. Which of the following measures is most important for maintaining fish survival?

- A. Adding aquatic plants in abundance to increase oxygen.
B. Installing aeration pumps (air pumps) to increase dissolved oxygen mechanically.
C. Heating the water to speed up fish growth.
D. Covering the pond to prevent evaporation.

164. What is the main source of the energy required for marine organisms to carry out their biological processes?

- a) O₂ gas. **B) Glucose.** C) CO₂ gas. D) Calcium carbonate.

165. Why are wave and wind movements important for aquatic life?

- A. They increase water depth.
B. They increase the surface temperature of water.
C. They enhance gas exchange between the atmosphere and water, increasing dissolved oxygen.
D. They prevent harmful algae growth.

166. How can a factory dumping organic waste into a river affect dissolved oxygen concentration?

- A. Waste increases water temperature, which decreases oxygen levels.
B. Waste directly consumes oxygen through chemical reactions.
C. Waste promotes bacterial growth that consumes oxygen during decomposition.
D. Waste prevents sunlight from reaching the water, which reduces photosynthesis and oxygen production.

167. When comparing a deep lake and a shallow lake in the same area, which one is expected to have greater daily variation in surface oxygen concentration?

- A. The deep lake, due to more water layers.
B. The shallow lake, because temperature and photosynthesis affect a smaller volume of water.
C. There is no difference between them.
D. It depends on the type of fish in each lake.

168. Which of the following human activities directly contributes to increasing carbon dioxide levels in water bodies?

- A. Overfishing. C. Building dams. **B. Industrial pollution.** D. Coastal tourism.

169. Increasing the percentage of CO₂ in the water works on:

- A- Increase acidification, increase calcification. **B- Increase acidification, reduce calcification.**
C- Reduce acidification, increase calcification. D- Reduce acidification, reduce calcification.

170. The studies have proven that the temperature of the upper part of the ocean water has increased by a certain amount every ten years over the last hundred years. In light of what you have studied, which of the following is from the results of that?

- A. Reducing the acidity of ocean water.**
B. Increasing the percentage of carbon dioxide gas in the atmosphere.
C. Reducing the percentage of dissolved salts in water.
D. Increasing the percentage of oxygen in water.

171. What phenomenon describes the movement of gases from a high concentration region to a low concentration region?

- A. Osmosis. **B. Diffusion.** C. Photosynthesis. D. Respiration.

172. What happens to the pH value at.....?

	increasing of O ₂ in water	increasing of CO ₂ in water
A	Doesn't change	Increases
B	Doesn't change	Decreases
C	Increases	Doesn't change
D	Decreases	Doesn't change

173. The skeleton of tilapia is formed of.....

- A) chitin and calcium phosphate. b) chitin and calcium carbonate.
c) collagen and calcium carbonate. d) collagen and calcium phosphate.

174. Marine organisms such as corals and mollusks depend on calcium carbonate to build their....

- A. Internal skeletons. B. Shells and exoskeletons. C. Gills. D. Fins.

175. Increasing the percentage of CO₂ gas in water works to convert.....

- A. Calcium carbonate insoluble in water to calcium bicarbonate soluble in water.
B. Calcium carbonate soluble in water to calcium bicarbonate insoluble in water.
C. Calcium bicarbonate insoluble in water to calcium carbonate soluble in water.
D. Calcium bicarbonate soluble in water to calcium carbonate insoluble in water.

176. Some coral reefs suffer from the phenomenon known as "bleaching," which is related to the increase in ocean acidity. What is the direct cause of this phenomenon?

- A. Decrease in dissolved oxygen. B. Increased dissolution of CO₂ forming carbonic acid.
C. Direct rise in water temperature. D. Pollution by heavy metals.

177. Which of the following best describes the dual effect of increasing carbon dioxide in water on organisms with calcareous structures?

- A. It facilitates respiration and strengthens their skeletons.
B. It increases water acidity, hindering shell formation but providing more carbon for photosynthesis.
C. It lowers water acidity, dissolving shells and reducing available oxygen.
D. It increases pH, making shell formation easier.

178. The opposite figure shows some aquatic organisms from (1) to (6) and the pH value of the water that is suitable for their living. Which of these organisms is(are) more adapted to increasing the solubility of CO₂ gas in water?

- A) (1). B) (2), (3). C) (4), (5). D) (6).



179. Which of the following statements is correct about the life in an aquatic environment?

- A. The increase in respiration is accompanied by increasing calcification.
B. The increase in organic decomposition is accompanied by a decrease in water acidity.
C. The increase in acidification is accompanied by an increase in respiration.
D. The increase in water acidity is accompanied by reduced calcification.

180. If the energy flow rate that reaches from the green algae to the aquatic larvae that feed on it decreases, it indicates that.....

- a. The number of mollusks that feed on larvae increases.
- b. The percentage of dissolved oxygen gas in water increases.
- c. The algae lost their ability to produce energy due to organic remains.
- d. The percentage of dissolved carbon dioxide gas in water decreases.

Lesson 8:

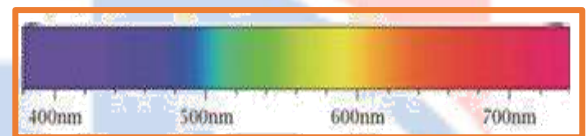
181. A small part of electromagnetic spectrum which differ from each other in frequencies and wave lengths refers to

OR The electromagnetic spectrum which propagates in the form of electromagnetic waves represents

- A) Invisible spectrum.
- b) Visible spectrum.
- c) X-rays.
- d) Gamma rays.

182. In the opposite figure, the ratio between frequency of red and that of violet spectrum equals to

- a) $1 \setminus 1$.
- b) $4 \setminus 7$.
- c) $7 \setminus 4$.
- d) $1 \setminus 2$.

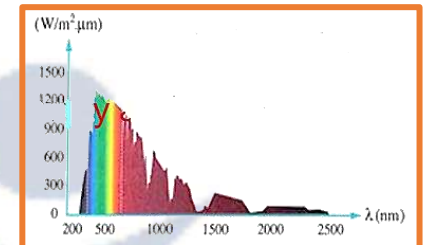


183. The visible light composed of different spectrum colors, which of the following has the maximum wave length?

- a) yellow color.
- b) orange color.
- c) green color.
- d) blue color.

184. The opposite graph represents the relation between light intensity and wavelength, so the ratio between the intensities of the wavelengths 500 nm and 1500 nm of solar radiation, respectively, at sea level is.....

- a) Equals to 1.
- b) Less than one.
- c) Greater than one.
- d) No relation.



185. The amount of solar energy that penetrates the water surface depends on at which the sun rays strike it.

- A. Intensity.
- B. Angle.
- C. Velocity.
- D. Wave length.

186. The amount of light that penetrates the water surface increases when the angle between the incident sun's rays and the water surface 90°

- a) Equals to.
- B. More than.
- C. Less than.
- D. Both A and B.

187. Which two quantities of the following decrease in magnitude with increasing depth in the Red Sea water in summer?

- a) Water density and its pressure.
- b) Water density and its temperature.
- C) Water temperature and its pressure.
- D) Water temperature and light intensity through it.

188. The figure at the front of you shows the solar radiation that fall inclined on the water surface, so the amount of energy that penetrates the water surface by decreasing inclination angle with the water surface.

- a) increases.
- b) decreases.
- c) unchanged.
- d) reduced.



189. When solar radiation passes through the surface layer of ocean water,.....

- a) The longer wavelengths of visible light are firstly absorbed.
- b) The shorter wavelengths of visible light are firstly absorbed.
- c) All wavelengths of visible light are completely absorbed together.
- d) None of the wavelengths of visible light is absorbed.

190. At 10 m depth from the surface of water more than % of visible light is absorbed

- a) 1.
- b) 10.
- c) 50.
- d) 90.

191. All infrared energy from sunlight is almost absorbed by water at depth

- A. 100 m.
- B. 100 cm.
- C. 10 m.
- D. 10 cm.

192. Which of the following light colors is Scattered after penetrating the surface of a water body?

- A. Warm colors.
- B. Cooler colors.
- C. No color.
- D. All colors.

193. The ocean's water warm color of visible spectrum as red and orange

- a) Reflects.
- b) Absorbs.
- c) Scatters.
- d) Disperses.

194. Which of the following colors penetrates the deepest clear tropical water?

- a) Red – 1%.
- b) Blue – 1%.
- c) Red – 50%.
- d) Blue – 50%.

195. In clear water Aquatic plants and Algae grow well down to depth of meters

- A. 100.
- B. 50.
- C. 10.
- D. 1.

196. Autotrophic organisms such as are abundant in the surface layer of water.

- a) Plants.
- b) Algae.
- c) Phytoplankton.
- d) All the previous.

197. Coral reefs thrive in water near the equator.

- A. Depth cold.
- B. Shallow cold.
- C. Shallow warm.
- D. Depth warm.

198. From tropical fish that live in warm water and require a specific temperature are.....

- a) Tuna and barracuda.
- c) Only barracuda.
- b) only tuna.
- d) Code.

199. Cold-water fish which live far from the equator are.....

- A. Tuna.
- B. Cod.
- C. Barracuda.
- D. Coral.

200. Fluids include substances.

- a. solid and liquid.
- b. solid and gaseous.
- c. liquid and gaseous.
- d. solid, liquid and gaseous.

201. All the following are properties of the liquids except

- a. no ability to flow.
- c. resists compression.
- b. has almost definite volume.
- d. takes the shape of the container.

202. Which of the following are measuring units of pressure?

- a. N/m^2 and Joule.
- b. N/m^2 and atm.
- c. Joule and atm.
- d. N/m^2 , Joule, and atm.

203. A liquid has a pressure at any point inside it equal to the of the liquid column above that point acting on the unit area of that point.

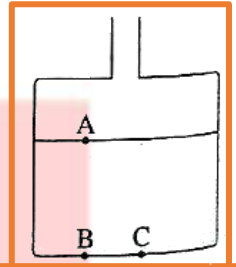
- a. density.
- b. volume.
- c. weight.
- d. mass.

Lesson 9:

204. Which has the greatest effect on increasing the pressure at a point inside a static liquid?

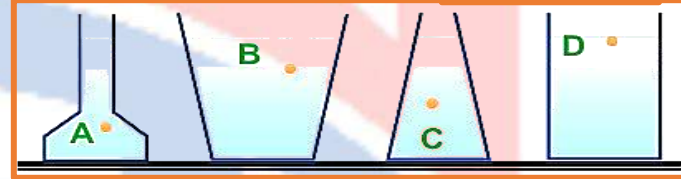
- A) Increasing the surface area of the liquid. B) Increasing the density of the liquid.
C) Increasing the viscosity of the liquid. D) Increasing the temperature of the liquid.

205. The opposite figure shows three points A, B and C in a glass tank that contains an amount of water which is exposed to atmospheric pressure, so the correct order of pressure values at the three points is.....



- a) $P_A > P_B = P_C$. b) $P_A > P_B > P_C$. c) $P_A < P_B < P_C$. d) $P_A < P_B = P_C$.

206. If a set of containers are filled with water as shown in the figure, the correct order of points A, B, C, D according to pressure is?



- $P_A > P_B > P_C > P_D$. b) $P_D > P_C > P_B > P_A$.
c) $P_A > P_C > P_B > P_D$. d) $P_D > P_B > P_C > P_A$.

207. Some animals can dive to a depth of 0.5 km.

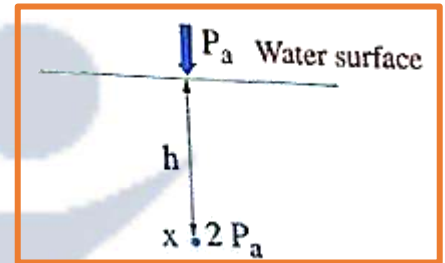
What is the total pressure they can withstand at this depth?

- a) 0.5 atm. b) 1.5 atm. c) 50 atm. d) 51 atm.

208. A submarine collapsed at a depth of 4000 m below the sea surface, if the pressure inside it was equal to atmospheric pressure, then the difference in pressure between the inside and outside of the submarine at that depth was.....

- a) 25 atm. b) 125 atm. c) 369 atm. d) 400 atm.

209. In the opposite figure, if the total pressure at point (x) at depth (h) in ocean water is double the atmospheric pressure at water surface, so at depth (3 h) from the surface of ocean water, the total pressure is.....



- a) 3 Pa. b) 5 Pa. c) 4 Pa. d) 6 Pa.

210. Water pressure increases by approximately for every 10 m below the surface.

- a. 1 N/m². c. 1 atm. b. 10 N/m². d. 10 atm.

211. How do fish living at great depths adapt to high pressure?

- A) By increasing the size of their swim bladder. B) By reducing the density of their bodies.
C) By increasing their heart rate. D) By increasing the size of their gills.

212. What is the main function of the swim bladder in fish that live at intermediate depths?

- a) Produces heat to maintain body temperature. b) Helps in digestion.
c) Controls buoyancy. d) Stores oxygen for respiration.

213. What is the importance of the unsaturated fatty acids in the composition of cell membranes of deep-sea fish?

- A) Increases the rigidity of the membranes. B) Maintains the fluidity of the membranes.
C) Increases the permeability of the membranes. D) Reduces the surface area of the membranes.

214. What is the main advantage of the cartilaginous skeleton in fish like sharks?

- a) It provides greater strength. b) It provides greater flexibility.
c) It makes the fish heavier. d) It provides no special advantage.

Lesson 10:

215. Which of the following expresses the final stability resulting from the interaction of living organisms with non-living environmental components for the continuity of life?

- a. Ecological balance.
- b. Nutrient balance.
- c. Aquatic system balance.
- d. Natural energy flow between living organisms.

216. What is the main purpose of maintaining ecological balance in aquatic ecosystems?

- a. To increase the population of all organisms.
- b. To ensure the continuous flow of energy through the food web.
- c. To increase the production of fish and other seafood.
- d. To maintain the dynamic stability of the ecosystem.

217. Which of the following elements is the most harmful to the health of aquatic organisms when its concentration in water increases?

- a. Nitrogen.
- B.Oxygen.
- c.Lead.
- d.Phosphorus.

218. How does the migration of salmon contribute to achieving balance in the surrounding environment?

- a. Consumes the largest amount of phytoplankton.
- b. Helps increase the number of predators.
- c. Compensates for its loss during its life cycle.
- d. Helps preserve coral reefs.

219. Coral reefs are known as "rainforests of the sea," and this is because they:

- a. Are considered producer organisms.
- b. Eliminate sea urchins.
- c. Provide a suitable habitat for many marine organisms.
- d. Serve as a shelter and safe haven for large predatory fish.

220. Which of the following factors is most likely to increase biodiversity within the aquatic environmental area?

- a. Increase in carbon dioxide ratio.
- b. Increase in predatory fish.
- c. Increase in salinity rates in water.
- d. Increase in phytoplankton.

221. When nutrient levels in an aquatic ecosystem are excessive, it leads to:

- a. Decreased plant growth rate.
- b. Increased biodiversity.
- c. Abnormal algae bloom.
- d. Ecosystem stability.

222. How does energy flow in an aquatic food web?

- a. From producers, such as algae, to consumers, such as herbivorous and predatory fish.
- b. Directly from predators to plants.
- c. From nitrogen to phosphorus.
- d. From deep-sea organisms to surface-dwelling organisms.

223. What is the most accurate explanation for the disruption of ecological balance in a lake over the long term after a decrease in green algae?

- a. Decrease in nutrient ratios.
- b. Consumption of the majority of dissolved oxygen gas.
- c. Increase in carbon dioxide gas concentration.
- d. Production of a large amount of oxygen.

224. What is the main cause of biodiversity loss in aquatic ecosystems?

- a. Sustainable fishing.
- b. Habitat destruction.
- c. Natural predation.
- d. Balanced nutrient levels.

225. Which of the following is NOT a negative impact of human activities on aquatic ecosystems?

- a. Pollution from pesticides and heavy metals.
- b. Sustainable development programs.
- c. Overfishing.
- d. Destruction of natural habitats, such as coral reefs.

226. Which of the following human activities leads to ecological imbalance in aquatic ecosystems?

- a. Pollution.
- b. Overfishing.
- c. Habitat destruction.
- d. All of the above.

227. Some studies have shown that climate changes increase imbalance in aquatic systems, threatening the balance among aquatic organisms. To preserve the aquatic ecosystem's ability for ecological balance, which of the following can be adopted?

- a. Protecting and expanding biodiversity areas such as coral reefs.
- b. Increasing the number of primary predatory species to maintain the food chain structure.
- c. Building artificial barriers to control environmental temperatures.
- d. Introducing species that resist temperature changes.

228. A marine area in one of the lakes faces a challenge of high pollution rates, where agricultural sewage water rich in nitrogen and phosphorus is discharged into this lake, disrupting nutrient balance and negatively affecting the balance among organisms in this aquatic system. Which of the following represents the best solution that reflects the positive role of humans in addressing the problem?

- a. Artificially pumping oxygen into the water regularly to combat oxygen deficiency resulting from the imbalance.
- b. Manually removing surface algae periodically to reduce biomass.
- c. Reducing excess nutrients before they reach the aquatic system, addressing the problem at the source.
- d. Banning fishing in the entire area.

229. Which of the following is NOT a role that humans can play to help maintain ecological balance?

- a. Preserving natural resources.
- b. Limiting environmental awareness programs.
- c. Promoting sustainable development.
- d. Avoiding pollution and overuse of resource.

230. How can humans contribute effectively to preserving natural resources?

- a. By promoting pollution.
- b. By using resources sustainably and avoiding overexploitation.
- c. By destroying coral reefs for economic purposes.
- d. By reducing environmental awareness initiatives.

231. Which of the following is not a strategy humans can use to maintain ecological balance in aquatic ecosystems?

- a. Preserving natural resources.
- b. Promoting unsustainable development.
- c. Increasing environmental awareness and education.
- d. Participating in environmental policy initiatives.

232. Which of the following is not from the followed methods that are used in the sustainable agriculture?

- a. Drip irrigation.
- b. Irrigation using stored rainwater.
- c. Increasing the cultivation of water-consuming plants.
- d. Increasing the cultivation of drought-resistant crops

233. A farmer suffers from a greater number of larvae that feed on the leaves of crops. Which of the following represents one of the solutions that belong to the concept of sustainable agriculture?

- a) Using specialized pesticides for this type of larvae.
- b) Combating the larvae using natural enemies that feed on them.
- c) Adding fertilizers to the soil of the agricultural land.
- d) Increasing the agricultural area.

**Chapter 2:
Lesson 1:**

234. All of the following are from the main role of the atmosphere except....

- a) protects Earth from harmful solar radiation.
- b) maintain the planet's surface temperature at moderate levels.
- c) plays a major role in the water cycle in nature.
- d) control the Earth's gravitational force.

235. Which of the following statements is correct regarding the solar radiation that reaches Earth's atmosphere?

- a) The atmosphere retains all the solar radiation that reaches it.
- b) The atmosphere retains only a part of the solar radiation.
- c) The components of the atmosphere absorb all the incoming solar radiation.
- d) The atmosphere retains only the visible spectrum of solar radiation.

236.is the most abundant gas in Earth's atmosphere.

- a) Oxygen gas.
- b) Nitrogen gas.
- c) Hydrogen gas.
- d) Carbon dioxide gas.

237. Although nitrogen gas is highly abundant in the atmosphere, its oxides are found in very small quantities because...

- a) it is produced from the decomposition of animals and plants.
- b) its reactions require special conditions such as lightning or extremely high temperatures.
- c) it reacts with oxygen at low temperatures.
- d) it reacts with oxygen during natural phenomena such as rainfall.

238. Argon makes up about of the Earth's atmosphere.

- a) 0.04%.
- b) 0.93%.
- c) 78%.
- d) 21%.

239. is one of the greenhouse gases that trap heat within the Earth's atmosphere.

- a) Nitrogen.
- b) Carbon dioxide.
- c) Oxygen.
- d) Argon.

240. The ratio of the volume of oxygen gas in the air to the total volume of air is approximately.....

- a) $\frac{3}{4}$.
- b) $\frac{1}{2}$.
- c) $\frac{4}{5}$.
- d) $\frac{1}{5}$.

241. The ratio of the volume of argon gas to the volume of carbon dioxide gas in the atmosphere is...

- a) $\frac{21}{4}$.
- b) $\frac{78}{21}$.
- c) $\frac{4}{93}$.
- d) $\frac{93}{4}$.

242. Most weather phenomena occur in the

- a) Mesosphere.
- b) Troposphere.
- c) Thermosphere.
- d) Ionosphere.

- 243.** The troposphere layer extends up to about above the Earth's surface.
a) 100 km. b) 20 km. **c) 10 km.** d) 50 km.
- 244.** The stratosphere extends from an altitude of km up to about km above Earth's surface.
a) 10-50. b) 10-30. c) 20-30. d) 10-40.
- 245.** The thickness of the mesosphere is about.....
a) 20 km. **b) 30 km.** c) 50 km. d) 80 km.
- 246.** Which layer used in long-distance wireless communication due to its ability to reflect radio waves?
a) Troposphere. b) Stratosphere. c) Mesosphere. **d) Ionosphere.**
- 247.** The layer that absorbs short-wavelength ultraviolet (UV) radiation is layer.
a) Argon. **b) Ozone.** c) Nitrogen. d) Oxygen.
- 248.** The temperature remains relatively constant in the lower stratosphere until around km.
a) 10. **b) 20.** c) 50. d) 40.
- 249.** The ozone layer extends approximately from km up to Km, above the Earth's surface.
a) 20-50. b) 10-40. **c) 20-40.** d) 20-60.
- 250.** The temperature at the Mesosphere layer drops to
a) -90°C. **b) -93°C.** c) -39°C. d) -50°C.
- 251.** The mesosphere plays a vital role in protecting life on Earth from
a) UV radiation. c) high temperature. **b) meteors.** d) Comets.
- 252.** The atmosphere layer that extends from 80km to about 550 km above the Earth surface.
a) Ionosphere. c) Troposphere. b) Mesosphere. d) Stratosphere.
- 253.** is the highest layer of Earth's atmosphere.
a) Stratosphere. **c) Exosphere.** b) Mesosphere. d) Ionosphere.
- 254.** The exosphere extends from an altitude of about km to km above Earth's surface.
a) 600-1000. **b) 700-1000.** c) 700-1200. d) 700-800.
- 255.** The thickness of the thermosphere is approximately
a) 30 km. b) 40 km. **c) 620 km.** d) 700 km.
- 256.** A thin layer of air that acts as a transitional zone between the troposphere and the stratosphere is called the.....
a) tropopause, which protects Earth from harmful radiation.
b) tropopause, which prevents the mixing of air between the two layers.
c) ozone layer, which protects Earth from harmful radiation.
d) ozone layer, which prevents the mixing of air between the two layers.
- 257.** The atmospheric layer preferred for airplanes flight is.....
a) troposphere, because it is characterized by horizontal air movement.

- b) troposphere, because it is characterized by vertical air movement.
c) stratosphere, because it is characterized by horizontal air movement.
d) stratosphere, because it is characterized by vertical air movement.

258. Which layer of the atmospheric layers has the.....

	lowest air density?	highest air density?
(a)	Troposphere	Exosphere
(b)	Stratosphere	Troposphere
(c)	Exosphere	Troposphere
(d)	Exosphere	Stratosphere

259. In the opposite figure, if the air temperature at the Earth's surface is 30°C , then the ratio between the air temperatures at points X and Y on the Celsius scale ($t_x \backslash t_y$) is.....

- a) $9 \backslash 7$. b) $7 \backslash 9$. c) $13 \backslash 24$. d) $24 \backslash 13$.

260. The following table shows four gases W, X, Y, and Z and the effective speed of the molecules of each, Which gases may become rare or entirely absent on the surface Earth?

The gas	The effective (V_{rms}) of its molecules
W	8.2 km/s
X	10 km/s
Y	11.2 km/s
Z	15 km/s

- a) W and X only. b) Y and Z only c) W and Y only. d) X and Z only.

261. (V_{rms}) refers to of gas molecules.

- a) the effective speed. c) the average speed. b) the escaping speed. d) the instantaneous speed.

262. In the atmosphere, Nitrogen (N_2), Oxygen (O_2) molecules and atomic oxygen absorb photons of electromagnetic spectrum with wavelengths shorter than.....

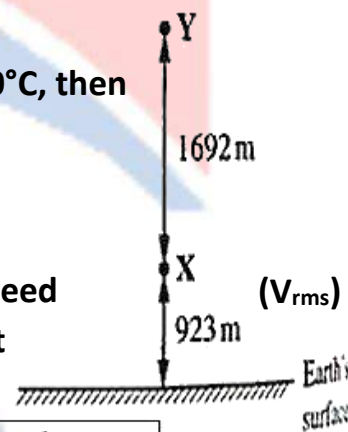
- a) 240 nm. b) 420 nm. c) 250 nm. d) 120 nm.

263. Formation of ozone (O_3), causes the absorption of photons in the ultraviolet region with wavelengths ranging from to

- a) 250-300. b) 240-310. c) 200-240. d) 150-300.

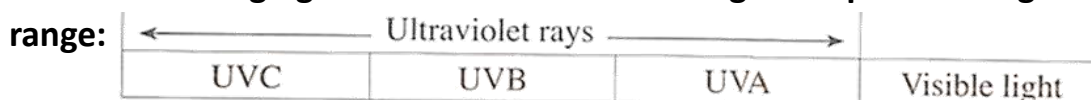
264. The ultraviolet rays compared to the visible spectrum have.....

- a) A longer wavelength, more energy. b) A shorter wavelength, more energy.
c) A longer wavelength, less energy. d) A shorter wavelength, less energy.



Lesson 2:

265. The following figure shows some electromagnetic spectrum regions and their wavelengths range:



(1) Which of these regions its rays cause photodissociation for oxygen molecules in the stratosphere? a) Visible light region. b) (UVA) region. c) (UVB) region. **d) (UVC) region.**

(2) Which of these regions' rays are absorbed by ozone after its formation in the stratosphere?

- a) All rays of the UVA region. b) All rays of the UVC region.
c) Part of the rays of the UVA and UVB regions. **d) Part of the rays of the UVB and UVC regions.**

266. The Ozone gases is formed in the atmosphere by the effect of

- a) Infrared radiation. **b) Ultraviolet radiation.** c) Gamma rays. d) X-rays.

267. When the bond between the two oxygen atoms in an oxygen molecule is broken due to photodissociation are formed.

- a) two oxygen ions (O^{-2}). **b) two single oxygen atoms (O).**
c) one oxygen atom (O) and one oxygen ion (O^{-2}).
d) two single oxygen atoms (O) and two oxygen ions (O^{-2})

268. Which of the following represent the right equations describe the formation of ozone gas?

- a) O_2 (gas) + UV rays $\rightarrow$ O (gas) + O (gas).** b) O_2 (gas) + UV $\rightarrow$ O_3 .
c) O_2 (gas) + O (gas) $\rightleftharpoons$ O_3 . d) (a) and (c).

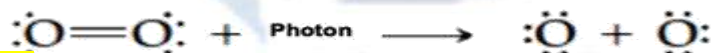
269. An ozone molecule is formed by the combination of

- a) two oxygen molecules (O_2). b) two individual oxygen atoms (O).
c) three individual oxygen atoms (O).
d) one individual oxygen atom (O) and one oxygen molecule (O_2).

270. What is the type of the bonds between the oxygen atoms in Ozone molecules.

- a) Ionic bond. **b) Covalent.** c) Physical bond. d) None of all.

271. What type of reaction is represented by the following equation?



- a) Photodissociation.** c) Thermal dissociation. b) Nuclear dissociation. d) Ionic dissociation.

272. Which of the following ultraviolet wavelengths causes photodissociation of the covalent bond in an oxygen molecule?

- a) 230 nm.** b) 240 nm. c) 290 nm. d) 305 nm.

273. Which of the following could represent the first step in the formation of ozone gas?



274. The chlorofluorocarbons (CFCs) resulted from

- a) photosynthesis process. **b) industrial activities.** c) respiration process. d) transpiration process.

275. The damage of skin cells can cause that may result in skin cancers.

- a) Genetic mutations. b) Melanoma. c) Anemia. **d) (a) and (b).**

276. Deterioration of Ozone occurs mainly due to the release of chemical compounds containing and

- a) Chlorine , Bromine.** b) Chlorine , Nitrogen. c) Nitrogen , Oxygen. d) Hydrogen , Oxygen.

277. How the eyes of the human affected by UV rays?

- a) development of the cataract.** b) the development of eyes cancer.
c) (a) and (b). d) None of the all.

278. From the actions that should be followed to reduce the ozone layer depletion are

- a) using chlorine and bromine compounds in cleaning products.
b) avoid using (CFCs) compounds in cooling systems.
c) using fire extinguishers contains halons gas. d) (a) and (c).

279. From the actions of reducing ozone layer depletion,.....

- a) Using chlorine and bromine compounds in cleaning products.
b) Using fire extinguishers that contain halon gas.
c) Using CFCs in cooling systems. **d) Using 410A gas in cooling systems.**

280. Which of the following options represents some of the health effects of ozone gas on humans?

- a) Cataracts, skin cancer, and decline in bee populations.
b) Skin cancer, weakened immunity, and destruction of plankton.
c) Reduced photosynthesis, impaired brain development.
d) Allergies, bronchitis, and cardiovascular diseases.

281. Smog is formed as a result of the accumulation of products from all the following reactions except

- a) the reaction of nitrogen and atmospheric oxygen during lightning.
b) the reaction of oxygen with sulfur under suitable conditions.
c) the reaction of hydrogen with oxygen under suitable conditions.
d) the reaction of nitrogen oxides with hydrocarbons in the presence of sunlight.

282. The ratio of ozone gas found in the stratosphere to that in the troposphere is.....

- a) less than 1. b) equal to 1. **c) greater than 1.** d) the answer cannot be determined.

283. Hereinafter some gases exist in the Earth's atmosphere: (I) Ozone gas, (II) Nitrogen dioxide, (III) Argon gas, (IV) Sulfur dioxide gas. Which of these gases contribute to the formation of smog?

- a) (I), (II) and (III). b) (III) and (IV). c) (II), (III) and (IV). **d) (I), (II) and (IV).**

284. A body with a temperature of 283 K equals on the Fahrenheit scale.

- a) 10 °F. **c) 50 °F.** b) 30 °F. d) 70 °F.

Lesson 3:

285. The boiling point of pure water equals

- a) 100 K. c) 373 °F. b) 212 °F. **d) 373 K.**

286. Which of the following expresses a form of adaptation to freezing?

- a) Producing a large amount of proteins before entering hibernation, as in the wood frog.
b) Producing a large amount of fats before entering hibernation, as in the wood frog.
c) Producing a large amount of antifreeze proteins, as in the ice fish.
d) Producing a large amount of antifreeze glucose, as in the ice fish.

287. When the sun's rays reach the Earth's surface:

(I) The temperature of the atmosphere begins to rise, and the temperature of the air layers near the Earth's surface becomes higher than the distant layers.

(II) Heat is transferred from the Earth's surface to the atmosphere.

(III) The temperature of the Earth's surface (land and water) begins to rise more than that of the atmosphere. (What is the correct order of the previous processes?)

- a) (I), (II) and (III). **b) (III), (II) and (I).** c) (II), (I) and (III). d) (I), (III) and (II).

288. The freezing point of pure water equals

- a) 0 K. c) 0 °F. b) 32 °F. **d) -273 K.**

289. At what temperature; the Fahrenheit scale equal to the Celsius scale?

- a) 20. b) - 20. c) 40. **d) - 40.**

290. Temperature is considered one of the most important climatic factors because it affects other factors such as:

- a) Atmospheric pressure and wind only. b) humidity only with.
c) Condensation and rainfall only. **d) All of the above.**

291. Meteorological agencies use which of the following scales to measure temperatures in scientific fields?

- a) Celsius scale. b) Fahrenheit scale. **c) Kelvin scale.** d) All of the above scales.

292. Study the following figure, then answer:

The suitable method for heat transfer through fluids is...

- a) conduction only. **b) convection only.**
c) convection and radiation. d) Conduction, convection and radiation.

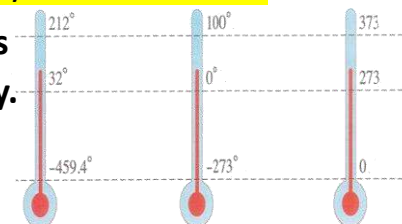


293. How does an icefish get oxygen?

- a) It is transported in the blood via hemoglobin. b) It secretes a transparent antifreeze protein.
c) It secretes a transparent antifreeze glucose. **d) It absorbs oxygen directly from the water.**

294. From the figure opposite, if the temperature on the Celsius scale rises by 1°C, it changes by on the Fahrenheit and Kelvin scales respectively.

- a) 1.8 - 1.** b) 33.8 - 274. c) 1 - 1.8. d) 274 - 33.8.



295. The temperature scale in the Egyptian system is.....

- a) Kelvin scale. b) Fahrenheit scale. **c) Celsius scale.** d) Both of the above.

296. The heat transfer mechanism from the Sun to the Earth is.....

- a) radiation and conduction. b) convection and conduction. **c) radiation only.** d) convection only.

297. When you hold ice cubes, the heat is transferred.....

- a) from your hand to the ice by convection. **b) from your hand to the ice by conduction.**
c) from the ice to your hand by convection. d) from the ice to your hand by conduction.

298. When some birds fly without flapping their wings, they depend on.....

- a) The rising warm air currents due to convection.**
b) The rising cold air currents due to convection.
c) The descending warm air currents due to convection.
d) The moving air currents opposite to its flying direction.

299. The wood frog can survive although its body partially freezes, due to.....

- a) changing skin color before freezing.
b) Storing small amounts of fats before freezing.
c) Reducing the amount of oxygen in the blood before freezing.
d) Producing large amounts of glucose in its vital organs before freezing.

300. How does the thorny devil lizard adapt to high temperatures and a dry desert environment?

- a) It changes its skin color to reflect more solar radiation and reduce heat absorption.
b) It increases its heart rate to increase blood flow to its skin for cooling.
c) It collects moisture from the air and directs it towards its mouth through small channels on its skin surface.
d) It stores small amounts of fat to cool its body.

301. If the atmospheric pressure at the top of a mountain is 750mm.Hg, it equals (Given that the usual atmospheric pressure equals $1.013 \times 10^5 \text{ N/m}^2 = 76 \text{ cm.Hg}$)

- a) 99967.11 N/m².** c) 101300 N/m². b) 89967.11 N/m². d) 1013 N/m².

302. Which of the following correctly expresses the effect of atmospheric pressure on the amount of oxygen available for breathing?

- a) Less in areas of low pressure.** b) More in areas of low pressure.
c) Equal in all areas of different pressures.
d) The amount in low-pressure areas is less than or equal to that in high pressure areas.

303. 8 millibar = a) 8000 N/m². c) 0.08 N/m². **b) 800 N/m².** d) 0.8 N/m²

304. Most of the atmosphere's mass is concentrated from the Earth's surface to an altitude of

- a) 10 km.** b) 20 Km. d) 30 Km. c) 40 Km.

305. What unit is used to express pressure in meteorological maps?

- a) cm Hg. b) N/m². c) mm Hg. **d) millibar.**

306. The normal blood pressure in healthy adults is aboutmmHg

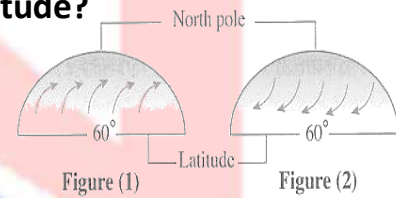
- a) 120/100. **b) 120/80.** c) 80/60. d) 150/120.

307. Which of the following blood components contain nutrients?

- a) Red blood cells. b) White blood cells. c) Blood platelets. **d) Plasma.**

308. Which of the opposite figures (1) or (2) correctly represents the direction of the polar winds between the north pole and the 60° latitude?

- a) Figure (1), because the atmospheric pressure is high at the north pole.
b) Figure (1), because the atmospheric pressure is low at the north pole.
c) Figure (2), because the atmospheric pressure is high at the north pole.
d) Figure (2), because the atmospheric pressure is low at the north pole.



309. If you have three different types of cells belonging to simple plant tissues, where cell (X) is a living cell thickened with a water-permeable substance, cell (Y) is a non-living cell, and cell (Z) has a thin cell wall and performs photosynthesis, which of the following represents the correct arrangement of (X), (Y), and (Z) cells, respectively?

- a) Parenchyma / Collenchyma / Sclerenchyma. b) Sclerenchyma / Parenchyma / Collenchyma.
c) Collenchyma / Sclerenchyma / Parenchyma. d) Parenchyma / Sclerenchyma / Collenchyma.

310. The cell walls of sclerenchyma tissue consist mainly ofsubstances.

- a) Cellulose and pectin. **b) cellulose and lignin.** c) pectin and chitin. d) cellulose and chitin.

311. The human body maintains a certain ratio of water and salts within it in a process known as.....

- a) Water balance (osmoregulation).** C) Water pollution. b) Hibernation. d) Calcification.

312. All of the following are greenhouse gases that cause global warming except:

- a) CH₄. b) CFCs. **c) O₃.** d) N₂O.

Lesson 4:

313. All of the following are negative effects of global warming except:

- a) melting ice and flooding of coasts.
b) decreased biodiversity due to extinction of polar organisms.
c) drought waves and hurricanes.
d) decreased biodiversity due to extinction of desert organisms.

314. The increase in greenhouse gases in the atmosphere prevents the penetration of _____, causing global warming.

- a) ultraviolet rays. c) radio waves. **b) infrared rays.** d) microwave waves.

315. The main role of emissions from burning fossil fuels in causing global warming is...

- a) increasing Earth's surface absorption of sunlight.
b) forming a layer in the atmosphere that traps heat and prevents it from escaping.
c) directly reacting with polar ice, causing its melting.
d) increasing the amount of oxygen in the air, which raises its temperature.

316. In which of the following cases do cells resort to anaerobic cellular respiration?

- a) Increased oxygen in blood. b) Lack of carbon monoxide in the blood.
c) Weak bonding of oxygen to hemoglobin. d) Lack of carbon dioxide in the blood.

317. Carbon monoxide gas is characterized from oxygen gas by.....

- a) its ability to bind to hemoglobin. b) its inability to bind to hemoglobin.
c) having a binding ability to hemoglobin greater than nearly 250 times.
d) having a binding ability to hemoglobin less than nearly 250 times.

318. Which of the following factors is a main catalyst for the conversion of sulfur dioxide to sulfur trioxide in the atmosphere?

- a) Increase in atmospheric humidity. B) Lack of oxygen. c) Sunlight. d) Ground-level ozone.

319. Which of the following steps begins the formation of sulfuric acid from acid rain?

- a. The reaction of sulfur trioxide with water. b. The oxidation of sulfur dioxide to sulfur trioxide.
c. The oxidation of fossil fuels containing sulfur. d. The reaction of sulfur dioxide with water.

320. Which of the following is a direct effect of the compound formed from the reaction of NO_x with volatile organic substances in the presence of sunlight?

- a) Increasing the absorption of chlorophyll to light. b) Improving the plant's respiration.
c) Reducing the respiration capacity. d) Increasing the soil fertility.

321. Which of the following compounds, when dissolved by acid rain, causes the corrosion of ancient statues?

- a) Sodium chloride. b) Ammonium bicarbonate. c) Calcium carbonate. d) Calcium phosphate.

322. All of the following are effects of acid rain on ecosystems except.....

- a) loss of biodiversity. b) the formation of ground-level ozone.
c) the removal of nutrients. d) the destruction of monuments.

323. The occurrence of the following processes leads to the corrosion of building facades:

- (1) Binding of sulfur trioxide with water in the air.
(2) The reaction of calcium carbonate with acid rainwater.
(3) The oxidation of sulfur dioxide. (4) The oxidation of fossil fuels containing sulfur.

Which of the following represents the correct order of these processes?

- a) 4,1,2,3. b) 3,2,4,1. c) 4,3,1,2. d) 2,1,3,4.

324. Carbon monoxide is called the "silent killer" because.....

- a) It results from the incomplete combustion of fossil fuels. b) It causes respiratory irritation.
c) It prevents oxygen from entering the respiratory system. d) It is an odorless toxic gas.

325. What is the essential role of gas scrubbers?

- a) The formation of sulfuric acid from sulfur oxides.
b) The removal of sulfur and nitrogen oxides from factory air.
c) The formation of nitric acid from nitrogen oxides.
d) The removal of sulfuric and nitric acids from rain

326. Using climate models, it was predicted that the Earth's average temperatures would rise by about.....

- a) 1-1.5°C. b) 2-3°C. c) 0.5-1°C. d) 1.5-2°C.

Question 2:

Essay Questions:

A) Write the scientific term for each of the following statements:

1) A community of living organisms interacting with each other and with the other abiotic components.	(Environment)
2) It is a nearly closed system that is able to change the Earth's surface physically, chemically, and biologically through a continuous change between the three states of water.	(water cycle or Hydrological cycle)
3) It is a process by which the plant gets rid of excess water through the stomata.	(Transpiration)
4) Microscopic openings found on the surfaces of leaves and green stems, through which most transpiration occurs.	(Stomata)
5) A measurement for the atom's ability to attract the electrons of the chemical bond towards itself for a longer period of time.	(Electronegativity)
6) An electrostatic attraction between the partially positive hydrogen atom in a water molecule and the partially negative oxygen atom in an adjacent water molecule.	(Hydrogen bond)
7) A scale that expresses the acidity or basicity of water. A scale in which values range from zero to 14.	(pH scale)
8) A solution in which the concentration of hydrogen ions is equal to the concentration of hydroxide ions.	(Neutral solution)
9) Any substance that can flow and does not have a fixed shape but takes the shape of its container.	(Fluids)
10) The mass of a unit volume of a substance.	(density)
11) The ratio of the density of a certain substance to the density of pure water at 4°C	(Relative density)
12) - A quantitative description of the hotness or coldness of a body or a system. - A measure of the average kinetic energy of the molecules of a body or a system.	(Temperature)
13) Organisms that depend on external sources to regulate their body temperature.	(cold-blooded organisms or poikilotherms)
14) A homogeneous mixture of solvent and solute.	(solution)
15) The rate of liquid evaporation is equal to the rate of its vapor condensation at constant temperature and pressure in a closed system.	(Dynamic equilibrium)

16) The phenomenon of transferring the water molecules from a diluted solution to the concentrated solution through a semi-permeable membrane that separates between the two solutions.	(Osmosis)
17) The pressure that causes the transfer of water from low-concentrated solution to high-concentrated solution through semi-permeable membrane.	(Osmotic pressure)
18) The most abundant chemical substance in living organisms and all vital processes depend on it.	(-water-)
19) Specific catalysts or activators increase the speed of chemical reactions in the cell.	(Enzymes)
20) A set of continuous biochemical reactions that occur inside the living organism's cells	(Metabolism)
21) The minimum amount of energy required to start the chemical reaction.	(Activation Energy)
22) A structure that helps euglena to get rid of the excess water.	(contractile vacuole)
23) A process on which many marine organisms depend to form their shells and skeletons.	(calcification)
24) A solid substance that is slightly soluble in water and is used in the formation of the shells of marine animals.	(calcium carbonate)
25) A water soluble substance is formed when carbon dioxide gas dissolved in water reacts with calcium carbonate.	(calcium Bicarbonate)
26) The weight of a liquid column per unit area whose height is from a certain point inside the liquid to its surface.	(pressure at a point inside a liquid)
27) An organ present in some fish which is filled with gases to allow them to control their depth in water.	(swim bladder)
28) The gradual deterioration of the protective ozone layer in the atmosphere.	(Ozone layer depletion)
29) The phenomenon of the continuous rise in the temperature of the air adjacent to the Earth's surface due to the greenhouse gases.	(Global warming phenomenon)
30) * A group of gases in Earth's atmosphere traps heat and raises the temperature of the air adjacent to Earth's surface. * Gases cause the global warming phenomenon.	(Greenhouse gases)
31) Powerful computer models that describe the movement of atmosphere and its interactions.	(climate change)

B) Give reasons for:

1) Condensation has an important role in the water cycle in nature.

(As condensation participants in the formation of clouds.)

2) Water has an important role inside the living organisms' cells.

(As each cell of the living organism's cells are surrounded by a plasma membrane that allows the passage of water from outside to inside the living cell carrying the required substances for the cell and allows the passage of water from inside the living cell to outside carrying the wastes.)

3) The boiling point of water is high, even though it is a covalent compound.

(Due to the presence of hydrogen bonds among water molecules, which causes it to be in a liquid state and have a high boiling point.)

4) Water is a polar solvent.

(As the oxygen atom is characterized by being more electronegative than hydrogen atom. So, the electrons of covalent bond are attracted towards the oxygen atom forming a partial negative charge on the oxygen atom and a partial positive charge on the hydrogen atom.)

5) Dissolving table salt in water.

(Because water is a polar compound which can make hydrogen bonds to dissolve many salts and break them down into hydrated ions as a universal solvent for most substances.)

6) Dissolution of sodium chloride in water is not considered a hydrolysis process.

(Because the ions resulting from the dissociation of the salt don't react with water to form new acids or bases. Rather, the salt ions remain in the solution without bounding to water ions.)

7) The solution resulting from the hydrolysis of ammonium bicarbonate in water is neutral.

(As on dissolving ammonium bicarbonate (NH_4HCO_3) in water, hydrolysis takes place and the concentration of hydrogen ions (H^+) remains equal to the concentration of hydroxide ions (OH^-) which makes the solution neutral)

8) The solution resulting from the hydrolysis of sodium bicarbonate salt in water is alkaline.

(As on dissolving sodium bicarbonate salt in water, hydrolysis takes place and it leads to decreasing the concentration of hydrogen ions (H^+) and increasing the concentration of hydroxide ions (OH^-), which makes the solution alkaline)

9) Density has a unit of measurement, while relative density has no unit of measurement.

(Because density is equal to the quotient of two different quantities, while relative density is a ratio between two quantities that have the same unit of measurement.)

10) Fish live without freezing in frozen lakes or rivers.

(Because the surface layer of ice acts as a thermal insulator for the water below it, so the water close to the bottom remains at 4°C .)

11) When a molten cake is taken out immediately from the oven, we perceive the chocolate to be much hotter than the cake. (Because the chocolate has a lower specific heat than the cake.)

12) Water has a high specific heat compared to other liquids.

(Because there are strong hydrogen bonds between the water molecules that require a large amount of energy to break them.)

13) Farmers in cold areas spray fruit trees with water.

(Because water has a higher specific heat, which helps it stay without a significant change or sharp drop in its temperature.)

14) Water causes a moderate climate in coastal areas in both winter and summer.

(Because water has a higher specific heat, which helps it stay without a significant change during summer, causing the sea breeze or a sharp drop in its temperature during winter)

15) Pure water evaporates faster than aqueous solutions.

(Because the number of molecules subjected to evaporation from the surface of the solution is lower, because some solute molecules or ions occupy a part of the liquid surface, as the energy required to overcome the attraction forces between water molecules and solute molecules or ions increases. Therefore the number of molecules that can be subjected to evaporation decreases and the solution vapor pressure decreases.)

16) The boiling point of a solution is higher than that of pure water at normal atmospheric pressure.

(As the solution vapor pressure decreases than the vapor pressure of pure water, due to the presence of attraction forces between the solvent (water) and solute molecules or ions, which lead to increasing the required energy to evaporate the liquid.)

17) Water is essential for life.

(1) Water is as a universal solvent, allowing biochemical reactions to occur by dissolving salts and nutrients and carrying gases to facilitate their transport inside the organism and getting rid of wastes out of it.

(2) It is the main component of cytoplasm, which enables the cell to maintain its shape and form.

(3) Due to its high specific heat, it helps living organisms maintain stable internal temperatures.

(4) It is a basic factor in maintaining internal balance and supporting the complex chemical activities of life.)

18) Bacteria are prokaryotes organisms.

(Because they are living organisms whose cytoplasm contains a genetic material that is not surrounded by a nuclear membrane.)

19) The cell wall of the bacterial cell contains peptidoglycan. (To give it the shape and rigidity)

20) Water is considered a basic factor in maintaining internal balance and supporting the complex chemical activities of life.

(as it directly participates in metabolic processes, on which the organism life depends)

21) Living organisms maintain stable internal temperatures despite its fluctuations outside.

(due to the high specific heat of water.)

22) The bony fish have a swim bladder or air sac.

(Because the swim bladder helps the bone fish to float in water.)

23) The living organisms in aquatic environment have the ability to effectively regulate blood pressure.

(Because they have strong, durable arteries and veins to withstand the high pressure.)

24) Sea bottom fish have strong and hard arteries and veins.

OR The Viper Fish is characterized by the flexibility of its skeletal structures.

(To withstand the very high pressure exerted on them.)

25) The percentage of oxygen dissolved in Red Sea water is higher than that in water of Suez Gulf. Because the strength of waves in the Red Sea is more than that in the Gulf of Suez which leads to an increase in the exchange of gases between the atmospheric air and water, therefore the solubility of oxygen gas increases.

26) When the percentage of carbon dioxide gas increases in water, the respiration process of marine organisms is negatively affected.

Since the high levels of carbon dioxide in water may lead to a decrease in the percentage of dissolved oxygen, which obstructs the respiration of aquatic organisms.

27) In turbid water aquatic plants found closer to the surface?

Or Photosynthesis mainly occurs in the surface layers of water bodies.

Or Algae and phytoplankton are abundant in the surface layers of water bodies.

Due to the presence of light in sufficient amount for accomplishing the photosynthesis process.

28) Symbiotic algae live inside the coral tissue?

Because the coral reefs flourish (thrive) in the shallow warm water near the equator where the solar radiation is available throughout the year, so it can provide algae with Corals provide protection, carbon dioxide gas, and minerals such as nitrogen and phosphorus.

29) Solar radiation is a vital factor in maintaining the ecological balance in aquatic environments. due to its direct effect on the photosynthesis process, which is essential for marine life, and water temperature, which affects the distribution of marine organisms.

30) Marine organisms are distributed unevenly in the water?

Since the light intensity decreases gradually as the water depth increases and the marine organisms are distributed unevenly in water according to their need for light and energy, so we find that the autotrophic organisms that depend on photosynthesis like algae and phytoplankton are abundant in surface layers of water.

31) Tropical fishes such as tuna prefer to live in a tropical region?

Because solar radiation directly affects water temperature, which in turn affects the distribution of aquatic organisms such as tuna, which live in warm water, as it need specific temperatures to survive and reproduce.

32) The organisms that live near the water surface have physical or body structure is less strong than those that live in the depths.

Because organisms that live near the water surface are exposed to a relatively low water pressure.

33) Rays fish don't have swim bladders.

To ensure that it doesn't collapse under the high pressure of water at depths.

34) Deep-sea fish have developed unique adaptations in their cell membranes to withstand the immense pressure at great depths.

because their cellular membranes are characterized by the presence of high levels of unsaturated fatty acids in their structure, which helps in maintaining membrane fluidity and stability which prevents cell damage.

- 35) The importance of nutrient balance in aquatic environments.
(to ensure maintaining the balance of nutrients, the diversity of living organisms, and the flow of energy through food webs)
- 36) The negative impact of overfishing on the ecological balance of aquatic environments.
(* It can lead to a decrease in the populations of certain species.* It disrupts the ecological balance)
- 37) The exosphere is an ideal region for placing satellites and spacecraft.
(Due to the extremely low air density of this layer, so satellites and spacecraft face almost no resistance, which allows them to remain in their orbits for long periods.)
- 38) Temperature of the thermosphere reaches higher than 2000°C.
(Because oxygen and nitrogen in this layer absorb most of the high-frequency (high-energy) solar radiation, such as X-rays and gamma rays.)
- 39) Ionosphere is used in long-distance radio communications.
(Since it is the layer with the highest concentration of charged particles, that reflects radio waves when they collide with these particles.)
- 40) The Earth retains its atmospheric air.
(Due to its relatively strong gravitational pull, so the effective velocity of atmospheric gases molecules will be less than the escape velocity of the planet.)
- 41) We must avoid using cleaning substances which contain bromine and chlorine compounds.
(to Reduce ozone layer depletion)
- 42) The using of fire extinguisher that contains halon gas must be avoided.
(To reduce ozone layer depletion as halon gas contains bromine which is considered one of the most powerful ozone depleting substances.)
- 43) The excess exposure to the UV may cause skin cancer.
(due to DNA damage in skin cells that causes gene mutations.)
- 44) Ozone has positive and negative effects.
(Its presence in the stratosphere protects the Barts from harmful ultraviolet rays that can destroy living organisms, while its presence in the troposphere has several negative effects, including:
-Smog formation. -Affecting the growth and quality of plants and agricultural crops.
-Corrosion of some substances, such as plastics and rubber)
- 45) The atmospheric pressure affects on weather and climate.
(as the difference in atmospheric pressure between two regions at the same horizontal level causes air to move from the high pressure area to the low pressure area, causing the wind movement by specific speed affects on the distribution of heat and humidity in the atmosphere, which affects the climate in different regions, and therefore strong winds may lead to significant changes in the weather.)
- 46) The mountain climbers may suffer from the rupture of tiny capillaries in the nose.
(Because ascending to higher altitudes, the atmospheric pressure decreases, which increases

the difference between the blood pressure inside the blood capillaries and the atmospheric pressure outside, which may cause the blood capillaries in the nose to burst)

47) The necessity of maintaining normal blood pressure in a healthy person.

(To ensure the transport of oxygen and nutrients to tissues and it keeps the heart and blood vessels healthy in general)

48) The increase in greenhouse gases in the atmosphere causes the global warming phenomena.

(Greenhouse gases significantly prevent the thermal radiation from escaping into outer space.)

49) The recovery of some coral areas in the Great Barrier Reef in Australia after 2016.

(As preventive measures are taken, such as decreasing the pollution resulting from coastal activities and temporarily restricting fishing and tourism, based on what the weather monitoring centers predicted about the occurrence of a marine heat wave and a significant rise in ocean water temperature along the Great Barrier Reef in Australia, which reduced the extent of losses and helped some coral areas to recover)

C) What happens in each of the following cases:

1) A quantity of pure water with a mass of 1 kg and a temperature of 8 °C.

What happens to its density in each of the following cases:-

First: Adding 1 kg of pure water at a temperature of 8 °C to it? (The density does not change.)

Second: Dissolving 34 g of table salt in it? (The density increases.)

2) The Gulf stream carries warm water from the equator to the north Atlantic Ocean? (Leads to: Moderating the climate of some regions such as Western Europe and enhancing the biodiversity of marine life.)

3) reaching the effective speed of a gas molecules on Earth's surface till about 20 km/s.
(the gas molecules can escape the planet's gravity and drift into space.)

D) What is meant by:

1) Excretion. (It is the process by which living organisms eliminate waste products resulting from the metabolic processes.)

2) The internal energy of the object equals 1000 Joules?

(This means that the sum of kinetic and potential energies of the molecules in the system or the body equals 1000 J .)

3) The specific heat of liquid water equals 4180 J/Kg.K?

(This means that the amount of heat required to raise the temperature of 1 kg of liquid water by one degree Celsius or one kelvin is 4180 J.)

4) The latent heat of vaporization.(the thermal energy absorbed by a unit mass (1 kg) of a substance to change from a liquid to a gaseous (vapor) state without a change in temperature. (Or, released when the substance changes from a gaseous (vapor) state to a liquid state without a change in temperature.)

5) vapor pressure of a solution. (It is the liquid vapor pressure on the liquid surface in a closed container, when the liquid and its vapor are in dynamic equilibrium at a constant temperature and pressure.)

E) Compare the following:

1) hydrolysis of (sodium bicarbonate, ammonium bicarbonate, and ammonium chloride):

P.O.C	sodium bicarbonate	ammonium bicarbonate	ammonium chloride
pH value of the solution	pH > 7	pH = 7	pH < 7
The concentration of [H ⁺] and [OH ⁻]	(H ⁺) < (OH ⁻)	(H ⁺) = (OH ⁻)	(H ⁺) > (OH ⁻)
Type of the solution	Alkaline	Neutral	Acidic
Equation	$\text{NaHCO}_3(s) + \text{H}_2\text{O}(l) \rightarrow \text{Na}^+_{(aq)} + \text{OH}^-_{(aq)} + \text{H}_2\text{CO}_3(aq)$	$\text{NH}_4\text{HCO}_3(s) + \text{H}_2\text{O}(l) \rightarrow \text{H}_2\text{CO}_3(aq) + \text{NH}_4\text{OH}(aq)$	$\text{NH}_4\text{Cl}(s) + \text{H}_2\text{O}(l) \rightarrow \text{NH}_4\text{OH}(aq) + \text{H}^+_{(aq)} + \text{Cl}^-_{(aq)}$

2) Kingdom Fungi and kingdom Protista.

P.O.C	Kingdom Fungi	kingdom Protista
number of cells	Multicellular, except yeast (unicellular)	Most of them are unicellular, and some are simple multicellular.
mode of nutrition	heterotrophic	They can be autotrophic or heterotrophic.
Examples	yeast	golden algae, protozoa.

3) Vertebrates animals and Invertebrates animals.

P.O.C	Vertebrates animals	Invertebrates animals
Definition	They are animals that have backbone	They are animals that have no backbone.
Examples	- Fish. - Amphibians. - Reptiles. - Birds. - Mammals, including humans at the top	- Sponges, such as sponges. - Coelenterates, such as jellyfish. -Worms. - Arthropods, such as insects.

4) Catabolism and anabolism.

P.O.C	Catabolism	anabolism
Definition	A process of breaking the chemical bonds among the atoms of complex molecules.	A process of building large and complex molecules from simple molecules .
Energy	release the energy that is stored in them.	consuming energy.
Examples	The breakdown of glucose sugar during the cellular respiration process to CO ₂ and water to produce energy.	-Synthesis of proteins from amino acids. -Photosynthesis process

5) The method of adaptation to the aquatic environment in which they live.

P.O.C	Structural (Anatomical)	Behavioral	Physiological (functional)
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Definition	They include changes in the structure and shape of parts of the living organism's body that help it survive in its environment.	They include certain actions or behaviors whether they are acquired or inherited that help the living organisms to face the harsh conditions or better utilize the available resources.	adaptations or Modifications in the way that living organisms perform their biological (vital) functions which enable them to survive in the environment where they live.
example	Large eyes in ice fish to be able to see in the dark.	Salmon migrate between fresh water and saltwater for reproduction and survival.	The ability of some fish to effectively adjust their blood pressure to be proportional to the external pressure.

6) Compare between fresh water fish and salt water fish in terms of:

P.O.C	Fresh water	Salt water
(a) direction of water flow between the fish's body and the aquatic environment.	Large amounts of fresh water pass into the bodies of fish.	Fish swallow large amounts of seawater to compensate for the loss of water from their bodies by osmosis.
(b) The method of adaptation to the aquatic environment in which they live:	Get rid of excess water through contractile vacuole in unicellular organisms or kidneys in multicellular in the form of diluted urine.	Get rid of excess salts through the kidneys and specialized cells in the gills.

7) The causes of acidification and calcification in terms of the percentage of dissolved CO₂ gas in water.

P.O.C	acidification	calcification
causes	An increase in the percentage of CO ₂ .	A decrease in the percentage of CO ₂ .

8) Bony fish (Osteichthyes) and Cartilaginous fish (Chondrichthyes) Concerning to:

P.O.C	Bony fish (Osteichthyes)	Cartilaginous fish (Chondrichthyes)
type of its skeleton:	Bony skeleton.	Cartilaginous skeleton.
Its weight:	Heavier.	Lighter.
Its flexibility:	Strong bones that help in supporting and maintaining the stability of the body under different pressures.	Cartilages that are more flexible.
Examples:	1) Tilapia fish. 2) Mullet fish.	1. Ray fish. 2. Sharks.

9) Satellite sensors and weather monitoring stations:

P.O.C	Satellite sensors	weather monitoring stations
Function:	Measure the concentrations of gases responsible for global warming such as: carbon dioxide and methane.	They measure temperature, atmospheric pressure, wind speed and pollutant concentrations.

F) Variant questions:

1) Discuss the following: First: The concept of environment. It is derived from the French word "Environ", which means "What surrounds us".

Second:- Its components with examples.

- Physical and Chemical elements, including abiotic factors, Such as: Light, air, water, and soil.
- Biological elements, including biotic factors, Such as: Humans, plants, animals, and microorganisms.

Third:- Its types of spheres. 1. Hydrosphere 2. Atmosphere 3. Lithosphere 4. Biosphere

2) Why is the water cycle considered an almost closed system?

Because only heat (energy) is exchanged with the air, as water moves continuously from one place to another through many different pathways, with a very little loss or gain in its mass.

3) What are the main processes in water cycle? The Water Cycle in Nature includes many processes, such as: 1) evaporation from water bodies. 2) Condensation leads to the formation of clouds.

3) Precipitation includes rainfall and snowfall.

4) infiltration through the pores of soil and sedimentary rocks.

4) Explain how clouds are formed and the importance of this process in the water cycle.

The heat of the sun causes water to evaporate forming water vapor which is carried upwards by the effect of air currents, lose its energy and its temperature decreases causing condensation process where tiny water droplets accumulate to form clouds.

Importance: it allows water to return to Earth as precipitation after Water droplets accumulate together, ensuring the continuous circulation of water on the Earth.

5) What are the biological processes that contribute to the water cycle?

some biological activities like:

✓ respiration and excretion in plants and animals. It also involves transpiration in plants.

6) What is the importance of transpiration for the plants?

1) Decreasing the temperature of plant parts.

2) Creating a pulling force that draws water and minerals through the xylem tissue, leading to elevating water and minerals from the root to the upper parts of the plant.

7) The figure shows two water molecules:

(1) What are the types of bonds (1) and (2)?

1) single covalent bond. 2) hydrogen bond.

(2) What is the value of the angle (3)? 104.5°

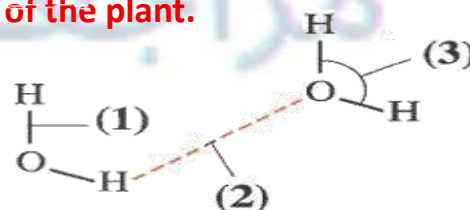
(3) Indicate the number of the bond that leads to an increase in the boiling point of water. Nu. (2).

(4) Indicate on the figure the partial positive charge and the partial negative charge.

Oxygen (partial negative charge), Hydrogen (partial positive charge).

8) Mention the factors affecting the density of the pure substance.

1) The mass of its molecules. 2) The distances between its molecules (intermolecular spaces).



9) What are the factors affecting the amount of heat gained or lost by a substance for changing its temperature? **1) Mass of the body (m). 2) Specific heat capacity for a body substance (c).**

3) The change in the temperature of the body.

10) Calculate the final temperature of the mixture formed from mixing 100 kg of water at 50°C with 250 kg of water at 50°C? **Since both water samples are at the same temperature (50°C), there is no heat flow between them. Therefore, the final temperature remains 50°C.**

11) A kettle holds 1.5 kg of liquid water at 50° C . How much heat energy (Q) must be supplied to bring the water to its boiling point (100°C)? (Given : the specific heat of water = 4180 J/Kg.K)

$$Q_{th} = m.c.\Delta t \quad Q_{th} = 1.5 \times 4180 \times (100-50) = 313500 \text{ Joule.}$$

12) Considering the different specific heats of land and seawater, explain the phenomenon of the sea breeze. **During the day, the water absorbs thermal energy from the Sun without experiencing a significant change in its temperature due to its high specific heat. So, its temperature remains low compared to the sand and rocks of the shore, whose temperature has risen significantly, therefore the temperature of the air touching the sand and rocks of the shore rises, so its density decreases and it rises up to be replaced by the cooler air that was in contact with the sea surface.**

13) Explain why the specific heat of water is a critical factor in the sustainability of marine life. **Because it maintains the stability of water temperature and reduces the impact of severe climate changes, which supports the sustainability of marine life. For example, coral reefs need a limited range of temperatures to survive, and temperature changes may lead to their death.**

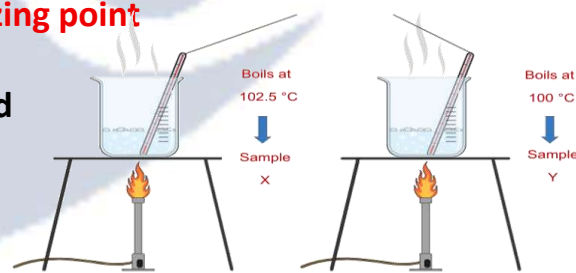
14) What is meant by the colligative properties of the solution? With determining them.

They are properties of the solution that depend on the number of ions or molecules of the non-volatile dissolved substance (solute), not on the type of the solute.

1) Lowering the vapor pressure 2) Depression in the freezing point

3)Elevation of the boiling point 4) Osmotic pressure

15) The figure shows two equal samples, one is pure water and the other is salt water. When both are heated to boiling, sample X is observed to boil at 102.5 °C, while sample Y boils at 100 °C. Indicate with an explanation which sample is pure water and which is salt water.



Sample Y is pure water as it boils at the specific B.P. of water, while sample X is salt water as the attraction force between water molecules and solute ions takes more energy to weaken it, so its B.P will increase

16) The following data table shows: Three samples of equal masses of impure water (X, Y, and Z) and the boiling point of each sample under a different atmospheric pressure.

The sample	Its boiling point
Sample X	101.5 °C
Sample Y	100.5 °C
Sample Z	102.5 °C

Arrange the three samples in ascending order by the value of the acting atmospheric pressure.

Sample Y < Sample X < Sample Z.

17) What factor in a living cell determines the classification of living organisms into two types?

According to their structure (number of cells), into: Unicellular organisms and Multicellular organisms. Or based on the presence or absence of the nuclear membrane that surrounds the genetic material into: (prokaryotic and eukaryotic)

18) Determine the factors by which eukaryotic organisms are classified?

According to the number of cells, Unicellular organisms and Multicellular organisms.

Or based on the mode of nutrition: autotrophic or heterotrophic. Or into four kingdoms, which are: (Protista, Fungi, Plantae, Animalia)

19) Identify the structures that distinguish a plant cell from an animal cell, and state the function of each.

1) Cell Wall (in plant only) : gives the cell its definite shape, encloses its components and protects it.

2) Vacuoles: - Plant cell: They are large in size and located at the center of the cell, which is called the "sap vacuole". - Animal cell: They are small in size and large in number.

- Function: They work to store food, water, and excess salts.

3) Chloroplasts(in plant only): in which the photosynthesis process occurs, because they have chlorophyll.

20) Explain the importance of enzymes in vital processes within the body of a living organism.

Enzymes work through a mechanism called "lock and key," where the active site of the enzyme binds specifically to the substance it affects (the substrate), which helps reactants convert into products more efficiently. At the end of the reaction, the enzyme remains unchanged, ready to catalyze another reaction of the same type.

21) What is meant by the thermal range of an enzyme? Explain its importance to the living organism. Each enzyme has an ideal temperature at which it works most effectively. If the temperature deviates higher or lower than its optimal range, the enzyme's activity gradually decreases until it stops completely. Importance:

1) They participate in chemical reactions inside the cell to increase their speed without being affected or changed.

2) They are specific, as each enzyme is specific to one reactant called a substrate.

3) They reduce the activation energy needed to start the reaction.

22) How does a living organism adapt to its surrounding environment? Explain.

In aquatic environments, whether in deep oceans or shallow lakes, every living organism possesses a set of adaptations (Structural, Behavioral, Physiological) that help it reproduce and survive according to different conditions such as changes in temperature, increased salinity, and others.

23) What is the role of gills in fish that live in salt water? to extract dissolved oxygen from water.

24) The figure shows an ice - fish. What do you know about this fish in terms of:

(a) The habitat in which it lives? lives in the cold southern oceans.

(b) The depth at which it lives? at depths reaching up to 2000 meters.

(c) The type of adaptation to suit its environment.

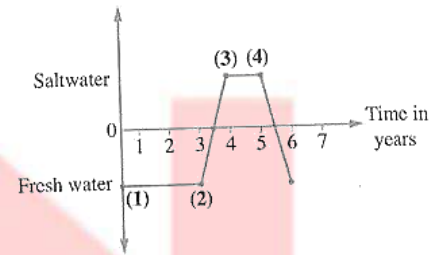
Structural (Anatomical) Adaptations: large eyes to enable them to see in the dark, and its body are compressed to withstand the extremely high pressure in deep waters.



25) Although dolphins are mammals, they can live in water. Explain. they are Structurally different from mammals that live on land, where they have:

1. Streamlined shape.
2. Fins instead of legs to help them swim.
3. Breathing openings at the top of their heads instead of noses that allow them to breathe atmospheric air.

26) The opposite graph illustrates the migration of salmon fish from fresh water to salt water for reproduction. Study it, then answer:



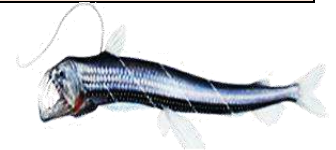
What number of stages represent:

- (a) The spawning of eggs? Nu.(1). (b) Sexual maturity? Nu. (4).
(c) What is the number of the stage in which smoltification occurs? Nu. (2).

27) What challenges do deep-water fish face? And how do they adapt to them structurally?

challenges	structure adaptation
1) lack of Light intensity.	1) Large eyes to be able to see in the dark.
2)Oxygen deficiency.	2) Large gills to extract the dissolved oxygen in water.
3)High-water pressure.	3)Compressed body to withstand the very high pressure in deep water and air bladder to float.

28) The figure represents a viper fish, a deep-sea fish. Write two structural and physiological adaptations of this fish that enable it to live in its environment.

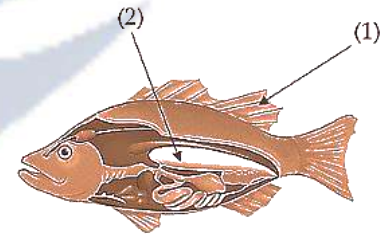


structural adaptations: large Gills to extract the dissolved oxygen in water and a Compressed body to withstand the very high pressure in deep water.

physiological adaptations: flexible skeleton to withstand the high pressure at depths and high levels of hemoglobin in its blood to adapt to the low oxygen levels at depths.

29) In the opposite diagram mention the name and the function of the labeled organs. 1) fins that serve as organs of locomotion.

2) swim bladder or air sac that helps them float in water.



30) Explain how sharks have physiologically adapted to increase external osmotic pressure.

They retain a high concentration of urea (a nitrogenous compound excreted in the urine of many animals) in their blood, which increases their osmotic pressure to become close to the osmotic pressure of the surrounding water. This helps reduce water loss from their bodies.

31) Think about what happens when tilapia fish move from the Nile River to the Mediterranean Sea. the osmotic pressure of the body fluids of tilapia fish will be less than the osmotic pressure of salt water, leading to swallowing large amounts of seawater to compensate for the loss of water from their bodies by osmosis and get rid of excess salts through the kidneys and specialized cells in the gills.

32) What is the effect of fresh water on the osmotic pressure of freshwater organisms' cells? And how do these organisms deal with this effect?

- the osmotic pressure of freshwater organisms' cells is more than the osmotic pressure of freshwater. Therefore: Large amounts of fresh water pass into the bodies of these organisms. These organisms' bodies get rid of the excess water to protect their bodies from bursting, either by contractile vacuole in unicellular organisms or kidneys in multicellular in the form of diluted urine.
- 33) What are the consequences of the inability of the organisms to maintain balance of water and salts within their bodies?
- (A) Freshwater fish. Large amounts of fresh water pass into the bodies of these organisms, leads to bursting.
- (B) Saltwater fish. Loss large amount of water which leads to dry and their death.
- 34) Physiological adaptations require structural adaptations to occur. Give one example. As most saltwater fish can adapt physiologically to the high water osmotic pressure by swallowing large amounts of seawater, then they get rid of excess salts through the two kidneys and specialized cells in gills (structural adaptation).
- 35) Define the concept of "gas solubility in water" and mention two main factors that affect it. def: It is the ability of the gas to dissolve in the water to form a homogeneous solution at a specific temperature and pressure. factors: temperature and pressure.
- 36) Describe the relationship between water temperature and the amount of dissolved oxygen. Why is this relationship important for fish? The amount of dissolved oxygen decreases when the water temperature increases, and this affects the production of energy required for marine organisms to carry out various biological processes through the oxidation of glucose molecules during cellular respiration processes.
- 37) Briefly explain how both photosynthesis and respiration of aquatic organisms affect the concentration of dissolved oxygen in water. Photosynthesis increases the concentration of dissolved oxygen in water, while respiration consumes it through the oxidation of glucose molecules for energy production to carry out various biological processes.
- 38) When studying an aquatic environment, an increase in swimming, hunting, and breeding activity is observed. Name one factor that leads to this? increasing the percentage of dissolved oxygen gas in water.
- 39) How can a factory dumping organic waste into a river affect dissolved oxygen concentration? Organic waste increases bacterial activity, which consumes large amounts of dissolved oxygen during decomposition, leading to a decrease in its concentration.
- 40) Explain why marine organisms that build shells and skeletons (such as oysters and corals) need an aquatic environment that is not highly acidic. Relate your answer to the increase in carbon dioxide in the atmosphere. as the external skeleton of some marine organisms, such as oysters and corals, consists of: Calcium carbonate (CaCO_3) that deposits to form their shells or skeletal structures, which is known as calcification process. An increase in the percentage of carbon dioxide leads to the conversion of: Calcium carbonate (Slightly soluble in water) into Calcium bicarbonate (Soluble in water) Therefore, the calcification process decreases, which obstructs the ability of these organisms to build or maintain their skeletons.

41) "The life in aquatic environment depends on a certain range of carbon dioxide gas concentration in water." Explain this statement.

*An increase in the percentage of CO₂ gas in water have several negative effects on aquatic organisms, including:

- 1) The decrease of pH value in water indicates the occurrence of acidification process which is harmful to many species of aquatic organisms, especially those in sensitive life stages such as egg and larval stages.
- 2) a decrease in the percentage of dissolved oxygen, which obstructs the respiration of aquatic organisms.
- 3) The conversion of calcium carbonate (Slightly soluble in water) into Calcium bicarbonate (Soluble in water) so the calcification process decreases, which obstructs the ability of these organisms to build or maintain their skeletons.

*A decrease in the percentage of CO₂ gas in water has several negative effects on aquatic organisms, including:

- 1) Reducing the efficiency rate of photosynthesis and energy production.
- 2) Reducing the formation rate of sugar such as glucose which limits the energy reserves in the producer organisms, thus affecting organisms at higher levels of the food chains.
- 3) An increase in the pH value of water negatively affects sensitive species that adapt to a certain pH range.

42) The light intensity gradually decreases by increasing water depth, the gradient of light defines different zones in oceans. Arrange these zones from the lightest zone to the darkest zone?

a) The euphotic (sunlit) zone. b) The twilight (mesopelagic) zone. c) The aphotic (deep) zone.

43) From the opposite figure, which shows the gradual penetration of Solar radiation through water surface, Mention what is the role of solar radiation in maintaining the ecological balance in the oceans? through its direct effect on:



- 1) the photosynthesis process, which is essential for marine life, where autotrophic organisms (such as aquatic plants, algae, and phytoplankton) thrive in the surface layers of water bodies depending on the availability of sufficient sunlight to carry out the photosynthesis process.
- 2) the water temperature, which affects the marine organism's distribution.

44) Explain the relationship between symbiotic algae and coral tissues?

The nutritional relationship between algae and coral reefs is mutualistic, as Some species of algae live inside coral reefs, where: (1) Corals provide protection, carbon dioxide gas, and minerals such as nitrogen and phosphorus for algae. (2) Algae provide oxygen gas, which is required for the respiration of coral reefs through photosynthesis, and also provide them with nourishment.

45) Explain the following statement: The disruptions in ecological balance due to changing intensity of solar radiation within the seasonal change or climate change. Changes in the intensity of solar radiation due to seasonal or climate change can lead to disruptions in the ecological balance. For example, in polar regions, where solar radiation is low

or nonexistent during winter, photosynthesis rates decrease significantly, which affects the availability of food for marine organisms.

46) Fish tank whose base area is 640 cm^2 containing water of weight 1280 N . What is the value of water pressure on the bottom of the tank in pascal? $P = F_g / A = 1280 / 640 \times 10^{-4} = 20 \times 10^3 \text{ pascal}$.

47) "In an aquatic ecosystem, the balance between organisms is greatly affected by interactions between elements of the food chain. If a type of predator species becomes extinct due to pollution..." Based on your studies, propose three solutions to compensate the loss of this species while ensuring the long-term sustainability of the aquatic system.

- 1) By avoiding the pollution of Water bodies by pesticides and heavy metals.
- 2) decreasing overfishing.
- 3) Developing and using clean and sustainable technology in agriculture and industry.

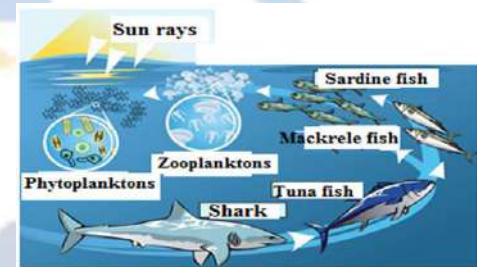
48) Natural reserves are among the most important means of maintaining the ecological balance of different environments. For example, there is the Ras Muhammad Natural Reserve in South Sinai. Explain the role of these nature reserves in maintaining ecological balance. as it provides a suitable habitat for many marine organisms, keeping them from loss by avoiding the pollution of resources and preventing overfishing.

49) In the opposite figure:

- What do you expect to happen if another predator is introduced in addition to the existing predator in this food chain? - Explain your answer.

the small fish are consumed in large quantities by predatory fish, this leads to an increase of zooplankton, which affects the growth of phytoplankton, and the flow of energy from the producers to the rest trophic levels is decreased, thus causing the imbalance of the aquatic ecosystem.

- What is the relationship between increased environmental pollution and the ecological balance in this marine food chain? Water bodies that are polluted by chemical substances such as pesticides and heavy metals that are discharged into water can affect the quality of water and are harmful to the aquatic organism's health.



50) Humans play a dual role in the ecological balance of marine ecosystems. Explain.

Humans are a significant factor in environmental changes, whether positive or negative.

✓ As there are negative impacts of Human Activities on marine ecosystems, such as:

- 1) discharging pesticides and heavy metals into water bodies, which cause pollution,
- 2) Overfishing leads to a decline in the populations of certain species,
- 3) Habitat destruction causes a loss of biodiversity.

✓ also, humans can Maintain Ecological Balance through:

- 1) Conserving Natural Resources. 2) Share Environmental Awareness to learn and understand the impact of their actions on the environment. 3) Adopting Environmentally Friendly Practices
- 4) Sustainable Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

51) Look at this picture and answer:



- a) What is the name of this phenomenon? **Aurora phenomenon.**
 b) Where do you can see it? **ionosphere, it is observed near the Earth's north and south poles.**
 c) Explain why it happen? **When high-energy charged particles from the sun (part of the solar wind) reach Earth, they are influenced by the planet's magnetic field and are directed toward the poles. There, these particles collide with ions and atoms in the ionosphere, exciting them. As these atoms return to their ground state (lower energy level), they release light photons of various wavelengths, resulting in the bright, colorful lights we see in the sky. (Aurora phenomenon)**

52) If the temperature at the bottom of a mountain is 20°C, find the temperature at its top of height

4000 m above its bottom. $\Delta t = \frac{4000}{1000} \times 6.5 = 26 \text{ }^{\circ}\text{C}.$

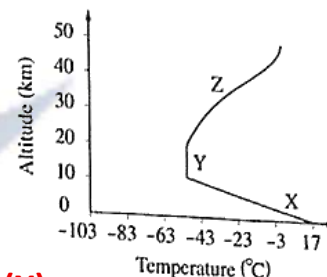
the temperature at the top = $t_{\text{bottom}} - \Delta t = 20 - 26 = -6 \text{ }^{\circ}\text{C}.$

53) Calculate the height of a mountain if the temperature at its base is 30°C, and at the top = -2.5°C.

$\Delta t = t_{\text{base}} - t_{\text{top}} = 30 - (-2.5) = 32.5 \text{ }^{\circ}\text{C}.$ $h = \frac{\Delta t \times 1000}{6.5} = \frac{32.5 \times 1000}{6.5} = 5000 \text{ m}.$

54) Explain with examples how the biological processes performed by living organisms and geological phenomenon cause a change in the percentages of the atmospheric components continuously.
biological processes such as, (1) In the process of respiration: Living organisms consume oxygen from the atmospheric air and release carbon dioxide, (2) In the process of photosynthesis: Plants absorb carbon dioxide from the atmospheric air and release oxygen.
geological phenomenon such as, Volcanic eruptions, as they add large amounts of gases to the atmosphere

55) The opposite graph shows the change in temperature with altitude above Earth's surface in the atmosphere:



- (a) What is the reason for the gradual decrease in temperature in region X?
Because with increasing altitude above Earth's surface, the air expands due to the decrease in atmospheric pressure, so the average kinetic energy of air molecules decreases, and hence the temperature gradually decreases in region (X).
 (b) Why is region Y preferred for aircraft flights? **Because air moves mostly in horizontal directions.**
 (c) Why does the temperature gradually increase in region Z? **Due to the presence of the ozone layer**

56) Rearrange in ascending order the atmospheric layers according to:

- (a) The altitude above the Earth's surface. **Troposphere → Stratosphere → Mesosphere → Thermosphere → Exosphere.**
 (b) The thickness. **Troposphere → Mesosphere → Stratosphere → Thermosphere → Exosphere**

57) Mention at least one use for UV rays in:

- a) Medical field. **Sterilizing surgical instruments and laboratory equipment to avoid microbial contamination.**
 b) Banknotes field. **Detecting counterfeit banknotes in stores.**

58) Mention the negative effects of UV rays on:

- a) Eyes. **accelerates the occurrence of cataract, which leads to reducing the light transmittance to the retina.**

b) Immune system. **The ultraviolet rays affect certain immune cells, such as helper T-cells, which leads a weakened immune response, making the body more vulnerable to diseases and infections.**

59) How does ozone in the troposphere negatively affect plants?

-Burning of plant leaves, which reduces their ability to perform photosynthesis.

-Damage to plants and agricultural crops, which negatively affects their growth and quality

60) Explain the steps of ozone formation in the stratosphere, writing the chemical equations.

(1) Oxygen molecule absorbs ultraviolet rays (UV) with a wavelength shorter than 240 nm that are coming from the Sun, which causes the breakdown of the covalent bond in oxygen molecule (O_2), giving two free (individual) oxygen atoms (O) which is known as photodissociation.

(2) Each free (individual) oxygen atom (O) binds with another oxygen molecule (O_2) to form ozone molecule (O_3).



61) Mention two actions that can be taken to reduce ozone layer depletion.

- Choose ozone friendly products, such as cleaning products that have an eco-friendly label or use natural alternatives like vinegar and baking soda instead of products containing chlorine and bromine compounds. - Avoid using ozone depleting substances, such as: Use modern fire extinguishers that are free of halon gas.

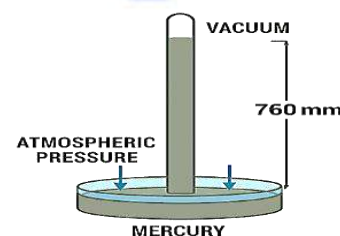
62) The figure shows a scientific instrument:

First: What is the name of the instrument? - **Mercury barometer.**

Second: What is it used for? **to measure The atmospheric pressure.**

Third: What does the height shown in the diagram (760 mm) represent?

Explain your answer. **It is found that at sea level, at zero degree Celsius ($0^\circ C$), the height difference of mercury column between the mercury surface level in the reservoir and its level in the tube equals 760 mm, and that is called the standard (normal) atmospheric pressure.**



63) If the temperature of a body is $20^\circ C$, what is the equivalent temperature on:

First: The absolute scale. **$T = 20 + 273 = 293 K$** Second: The Fahrenheit scale. **$t_f = (\frac{9}{5} \times 20) + 32 = 68^\circ F$.**

64) The opposite figure shows a bird flying without flapping its wings:

(a) What technique does the bird use to stay in the air for long periods of time without constantly flapping its wings? **Soaring (Thermal flight).**



(b) What is the name of the currents that the bird floats on to maintain its altitude? **Convection**

65) Write two factors affecting the humidity level with an explanation of the effect of one of them.

Factors that affect the percentage of humidity in air: (1) Atmospheric pressure.

(2) Temperature: A rise in temperature leads to: - an increase in the rate of water evaporation, the air molecules moving apart. - causing an increase in the amount of water vapor that a unit volume of air carries. so, the humidity of air increases.

66) Global warming has some negative effects as it causes some natural disasters. Explain this.

1) Melting of polar ice caps, which threatens environmental disasters, such as:

- Flooding of coasts and the disappearance of some coastal cities, Due to rising sea levels.

- Extinction of some polar species, Due to the destruction of their natural habitats.

2) Severe climate changes, such as: Hurricanes, Floods, and Drought periods.

حمل الآن

مجانا وحصريا

المراجعة رقم (4)

الترم الاول



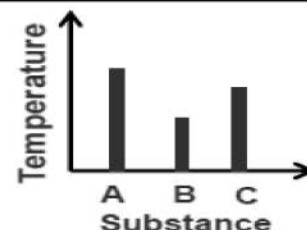


Final Revision

★(1) **Choose the right answer:**

Mr. Ahmed Elbasha

1. What is the approximate value of the angle between the covalent bonds in a water molecule?
a. 75.5° b. 90° c. 100° d. 104.5°
2. The solution resulting from the hydrolysis of sodium bicarbonate is basic because:
a. the concentration of $[H^+]$ is less than the concentration of $[OH^-]$
b. the concentration of $[H^+]$ is more than the concentration of $[OH^-]$
c. the concentration of $[H^+]$ is equal to the concentration of $[OH^-]$
d. the concentration of $[H^+]$ is equal to or less than the concentration of $[OH^-]$
3. The migration is one of the most important examples for behavioral adaptation in
a. Whale. b. Salmon. c. Viper. d. Dolphin
4. Which of the following statements represents the correct order of the light zones in water according to their depth from top to bottom?
a. Twilight zone – Dark zone – Sunlit zone
b. Dark zone – Sunlit zone – Twilight zone
c. Sunlit zone – Twilight zone – Dark zone
d. Twilight zone – Sunlit zone – Dark zone
5. The following figure represents the change happened to three substances have equal masses and same initial temperatures are heated for an equal period of time by the same thermal source. Which of the following is the correct order according to their specific heat?
a. $B < C < A$
b. $A < C < B$
c. $C < B < A$
d. $A < B < C$
6. The organelle that controls the cell's activities and contains the genetic material that determines the organism's traits is
a. sap vacuole b. mitochondria c. nucleus d. chloroplast

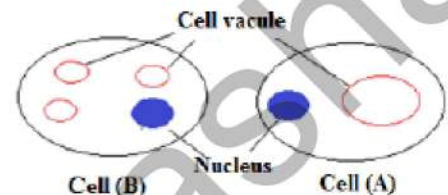


7. All the following are anabolic process except

- Formation of glucose in Photosynthesis process
- Synthesis of proteins
- Development of bones and muscles
- Breakdown of glucose sugar

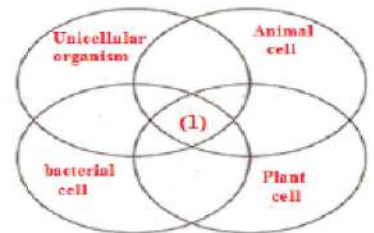
8. The figure represents two cells (A) and (B) . Study it and then answer:
Which of the following is true regarding the types of cells?

- Cell (A) is animal, while cell (B) is plant.
- Cell (A) is plant, while cell (B) is animal.
- Both (A) and (B) are animal cells.
- Both (A) and (B) are plant cells.



9. Study the schematic diagram opposite, which shows the components of the fine structure of the cells of four different organisms, then determine: Which component is represented by the number (1)?

- Cell membrane
- Cellulose wall
- Chloroplast
- Peptidoglycan



10. The freezing point of a certain concentration from magnesium chloride solution (MgCl_2) is that of the same concentration from potassium nitrate solution (KNO_3).

- greater than
- less than
- equal to
- no correct answer

11. Assuming that a liquid boils at 90°C , if it is exposed to high pressure, its boiling point can be

- 82°C
- 90°C
- 110°C
- 70°C

12. The water cycle in nature is known as cycle.

- hydrogen
- geological
- biological
- hydrological

13. What is the process that occurs to the output of transpiration during the hydrological cycle?

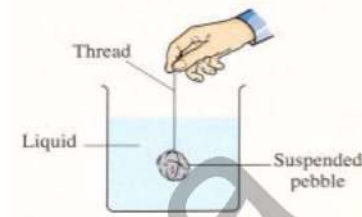
- Evaporation.
- Infiltration.
- Falling.
- Condensation

14. From the marine organisms that live(s) in the cold regions is/are

- coral reefs
- cod fish
- tuna fish
- barracuda fish

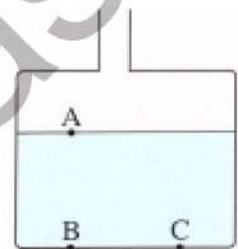
15. The opposite figure represents a pebble suspended to a string and submerged under a liquid surface, if the pebble is exposed to a certain pressure, which of the following actions will cause an increase in the pressure on the pebble?

- Polishing the surface of the pebble.
- Raising the pebble slightly upward.
- Dropping the pebble to the bottom of the beaker.
- Submerging the pebble to the same depth in a liquid of lower density



16. The opposite figure shows three points A, B and C in a glass tank that contains an amount of water which is exposed to atmospheric pressure, so the correct order of pressure values at the three points is

- $P_A > P_B = P_C$
- $P_A > P_B > P_C$
- $P_A < P_B < P_C$
- $P_A < P_B = P_C$



17. The opposite organism is characterized by

- being unicellular and lives in salty environment
- having a higher osmotic pressure inside it than that of its environment
- having a lower osmotic pressure inside it than that of its environment
- having a contractile vacuole to get rid of salts only



18. Which of the following is the correct sequence for the direction of energy flow in a food chain?

- Phytoplankton → Zooplankton → Fish → Bird
- Phytoplankton → Fish → Zooplankton → Bird
- Zooplankton → Phytoplankton → Bird → Fish
- Zooplankton → Fish → Phytoplankton → Bird

19. What is the probable result of increasing the temperature of an aquatic environment on the organisms living in it?

- Difficulty in breathing.
- Increasing photosynthesis process.
- Reducing calcification rate.
- Increasing activity of living organisms.

20. If the solubility of carbon dioxide gas in water equals X, the solubility of oxygen equals

- 50 X
- 500 X
- 0.02 X
- 0.002 X

21. The patient who suffers from severe stomach acid secretion (stomach acid reflux) is advised to

- a. use a suitable treatment that decreases the pH value
- b. use a suitable treatment that increases the pH value
- c. eat food that increases the (H^+) ions concentration
- d. drink soda that contains percentage of CO_2

22. The ratio between (H^+) ions concentration in an acidic solution to their concentration in an alkaline solution is

- a. greater than 1
- b. equals 1
- c. less than 1
- d. equals 7

23. On dissolving ammonium chloride salt in water

- a. hydrolysis takes place and the solution becomes acidic
- b. hydrolysis takes place and the solution becomes basic
- c. the salt dissociates but no hydrolysis takes place
- d. the salt doesn't dissociate and no hydrolysis takes place

24. The solution at which the concentration of (H^+) ions is less than the concentration of (OH^-) ions is

- a. acidic solution and its pH value is less than 7
- b. acidic solution and its pH value is greater than 7
- c. basic solution and its pH value is less than 7
- d. basic solution and its pH value is greater than 7

25. Colligative properties of a solution

- a. Depend only on the type of solute.
- b. Depend only on the type of solvent.
- c. Depend on both the type and concentration of the solute.
- d. Depend on the concentration of solute, not its type.

26. At a depth of 10 cm below the water surface, most of the energy of sunlight is absorbed in the form of

- a. Visible light
- b. Infrared rays
- c. Ultraviolet rays
- d. Blue light

27. Which of the following adaptations enables deep-sea fish to adapt with a lack of oxygen?

- a. Slower metabolic rate
- b. Compact body
- c. Increased salt concentration in cells
- d. Strong blood vessels

28. Which of the following values on the kelvin scale is equivalent to $10^\circ C$?

- a. 263 k
- b. 273 k
- c. 283 k
- d. 303 k

29.What type of bonds that connect water molecules?

- a. Ionic bond
- b. Hydrogen bond
- c. Covalent bond
- d. Metallic bond

30.Which element represents the largest proportion of the mass of a water molecule?

- a. Hydrogen
- b. Oxygen
- c. Both are equal
- d. Cannot be determined

31.Which of the following layers is considered the lowest layer of the atmosphere in terms of temperature, where the temperature reaches - 93°C?

- a. Thermosphere.
- b. Mesosphere.
- c. Stratosphere.
- d. Troposphere

32.When you hold ice cubes, the heat is transferred

- a. from your hand to the ice by convection
- b. from your hand to the ice by conduction
- c. from the ice to your hand by convection
- d. from the ice to your hand by conduction

33.At higher altitudes above sea level, which of the following is correct about the boiling point of pure water?

- a. It decreases as the atmospheric pressure increases .
- b. It decreases as the atmospheric pressure decreases.
- c. It increases as the atmospheric pressure decreases .
- d. It increases as the atmospheric pressure increases.

34.What is the mass of hydrogen in a sample of distilled water whose mass is 200 g?

- a. 11.11 g
- b. 22.22 g
- c. 88.89 g
- d. 177.78 g

35.The value of the angle between the two bonds in the water molecule is

- a. 10.45°
- b. 104.5°
- c. 105.4°
- d. 10.54°

36.Which of the following electromagnetic rays has its energy almost completely absorbed after 10 cm of penetrating the ocean surface?

- a. Blue rays.
- b. Red rays.
- c. Green rays.
- d. Infrared rays.

37.Which of the following doesn't achieve the ecological balance in the aquatic ecosystems?

- a. Expanding human activities.
- b. Variation of living organisms species.
- c. Nutrients balance.
- d. Energy flow through living organisms.

38. Which of the following organisms in the food chain are directly affected by a decrease in the concentration of carbon dioxide gas in water?

- a. Whales. b. Tilapia. c. Zooplankton. d. Phytoplankton.

39. If the boiling point of acetic acid at 1 atm pressure equals 118°C, it is expected that its boiling point at 0.8 atm pressure equals

- a. 111°C b. 118°C c. 119°C d. 125°C

40. All the following are from vertebrates, except

- a. fish b. amphibians c. reptiles d. arthropods

41. The organisms that live at great depths in oceans are characterized by the absence of air bladder such as

- a. sardine fish b. tilapia fish c. ray fish d. salmon fish

42. What is the main function of swim bladder in fish that live at intermediate depths?

- a. Maintaining the temperature of their body. b. Help in digestion.
c. Control their buoyancy d. Storage oxygen for breathing.

43. Which of the following heat transfer mechanisms relies on the movement of parts of the substance to transfer heat?

- a. Convection. c. Conduction.
b. Radiation. d. Conduction and radiation.

44. The heat transfer mechanism from the Sun to the Earth is

- a. radiation and conduction b. convection and conduction
c. radiation only d. convection only

45. The transfer of heat in the form of electromagnetic waves occurs in

- a. thermal conduction b. thermal convection
c. thermal radiation d. all of the previous

46. Ozone layer is located in the layer.

- a. exosphere b. mesosphere c. stratosphere d. troposphere

47. The maximum density of pure water at a temperature of

- a. 9 °C b. 4 K c. 90 °C d. 277 K

48. The density of water is 1g/cm³ at a temperature of 4°C. it is equivalent to

- a. 0.001 kg/m³ b. 1 kg/m³ c. 4 kg/m³ d. 1000 kg/m³

49. The absolute zero is equal to

- a. 0 k b. 273 k c. 0 °C d. 273 °C

50. The percentage of salt water is about from all water shapes on Earth.

- a. 1 % b. 3 % c. 70 % d. 97 %

51. Which of the following structures primarily helps fish move horizontally in water?

- a. Gills b. Fins c. Air bladder d. Scales

52. Which of following happens to an amoeba when its contractile vacuole is removed?

- a. The amoeba regulates its water needs naturally.
b. The amoeba can easily get rid of excess water.
c. The osmotic pressure inside it increases.
d. The osmotic pressure inside it decreases.

53. Water is a polar compound because:

- a. The electronegativity of oxygen is greater than the electronegativity of hydrogen.
b. The electronegativity of hydrogen is greater than the electronegativity of oxygen.
c. Oxygen carries a partial positive charge; hydrogen carries a partial negative charge.
d. Oxygen carries a partial negative charge; hydrogen carries a partial positive charge

54. Which of the following salts its hydrolysis produces an acidic solution?

- a. Sodium chloride b. Sodium bicarbonate
c. Ammonium chloride d. Ammonium acetate

55. When comparing the effective speed of the molecules of a number of gases, it was found that it is greater for the molecules that have

- a. the largest mass and the highest temperature
b. the largest mass and the lowest temperature
c. the smallest mass and the highest temperature
d. the smallest mass and the lowest temperature

56. The escape velocity of a gas from a planet depends on the

- a. planet's gravitational field strength
b. mass of the gas in the planet's atmosphere
c. speed of the gas molecules in the planet's atmosphere
d. chemical activity of the gas

57. What happens to the vapor pressure of an aqueous solution when increasing the concentration of the solute?

- a. It decreases . b. It increases. c. It isn't affected. d. It vanishes.

58. What happens to vapor pressure of the liquid when its temperature increases?

- a. It increases. b. It decreases. c. It isn't affected. d. It vanishes.

59. Water polarity causes

- a. the dissolution of many substances in it
- b. decreasing its density
- c. its acidic effect
- d. its basic effect

60. What is the type of bonds among water molecules?

- a. Hydrogen bonds.
- b. Single covalent bonds.
- c. Ionic bonds.
- d. Double covalent bonds.

61. What happens to the molecules of pure water when its temperature decreases from 4°C to 0 °C?

- a. They get closer to each other.
- b. They get away from each other.
- c. They remain consistent in their positions.
- d. Their volumes decrease.

62. What is the effect of increasing the concentration of dissolved oxygen in water?

- a. It helps in completing the photosynthesis process.
- b. It supports the growth of aquatic plants and fish.
- c. It reduces the pH value of water.
- d. It increases the strength of water currents and waves.

63. All of the following support the balance of aquatic ecosystem, except

- a. the increase of the percentage of dissolved oxygen in water
- b. the diversity of the aquatic organisms
- c. the increase of photosynthesis rate
- d. the extreme increase of water temperature

64. Which of the following increases the activity of fish in the aquatic environment?

- a. The increase of the percentage of dissolved oxygen in water.
- b. The decrease of the pH value in water.
- c. The increase of water salinity.
- d. The increase of the effects of human activities on water.

65. Which of the following factors increases the solubility of oxygen gas in water?

- a. The increase of water salinity and waves movement.
- b. The increase of waves movement and the decrease of temperature.
- c. The increase of the pH value and the temperature.
- d. The increase of acidification and the decrease of water salinity.

66. Which of the following decreases the percentage of carbon dioxide gas in water?

- a. The gases exchange between water and atmospheric air.
- b. The respiration of marine animals.
- c. Photosynthesis of algae.
- d. Industrial pollution.

67. In the food chains of different environments, the transfers among living organisms and

- a. food / the primary consumer in the chain is a carnivore
- b. energy / the first individual in the chain is heterotrophic
- c. food / the primary consumer in the chain is the plant
- d. energy / the first individual in the chain is autotrophic

68. Which of the following is one of the most important basic principles of sustainable development?

- a. Using natural resources.
- b. Increasing industrial production.
- c. Increasing the reliance on fossil fuel.
- d. No harming for the ability of future generations to meet their needs.

69. Which of the following practices is a positive step towards sustainability?

- a. Using fossil fuel as a source of energy.
- b. Collecting and recycling plastic and metal waste.
- c. Using individual means of transportation instead of public transportation.
- d. Irrigating agricultural land using traditional methods such as flooding.

70. Which of the following does its increase in seawater cause harms to oysters and corals?

- a. Phytoplankton.
- b. Carbon dioxide gas.
- c. Oxygen gas.
- d. Seaweeds.

71. The fall of acid rain saturated with carbon dioxide gas in an aquatic environment leads to

- a. reducing the pH value of water
- b. increasing the calcification rate of aquatic animals
- c. reducing the rate of the photosynthesis process
- d. increasing the activity of fish

72. Which of the following is negatively affected by increasing the percentage of CO₂ in the aquatic environment?

- a. Mosquito larvae and fish eggs.
- b. Small fish and aquatic plants.
- c. Phytoplankton and mollusks.
- d. Coral reefs and algae.

73. A decrease in the concentration of carbon dioxide in water leads to all of the following except

- a. increasing water acidity
- b. reducing energy produced by aquatic plants
- c. reducing energy reaching the predators
- d. increasing the pH value of water

74. Which of the following isn't considered from the results of increasing the percentage of dissolved carbon dioxide gas in water?

- a. Reducing the pH value of water.
- b. Increasing the ability of aquatic plants to produce food.
- c. Conversion of calcium bicarbonate into calcium carbonate.
- d. Difficulty in respiration of aquatic organisms .

75. Which of the following reduces the solubility rate of oxygen in water?

- a. Dissolving excess of carbon dioxide gas.
- b. Decreasing the salinity of water.
- c. Disturbance of water and waves.
- d. Increasing the efficiency rate of photosynthesis.

76. Which of the following is greatly affected by the absence of calcium carbonate in water?

- a. Photosynthesis process for plants.
- b. Respiration of invertebrates.
- c. Reproduction of fish .
- d. Formation of mollusks shell.

77. Increasing the percentage of CO₂ in water leads to

- a. increasing the pH of water
- b. supporting the respiration of marine organisms
- c. reducing the efficiency rate of photosynthesis
- d. improvement the rate of photosynthesis process

78. When solar radiation passes through the surface layer of ocean water

- a. the longer wavelengths of visible light are firstly absorbed
- b. the shorter wavelengths of visible light are firstly absorbed
- c. all wavelengths of visible light are completely absorbed together
- d. none of the wavelengths of visible light is absorbed

79. The sea appears blue, among the reasons of that is

- a. water does not absorb the wavelengths of blue light
- b. the water surface reflects the wavelengths of blue light
- c. the wavelengths of blue light penetrate deeper into water compared to other colors
- d. water absorbs the wavelengths of blue light first

80. Which of the following statements is correct about the life in aquatic environment?

- a. The increase of respiration is accompanied by increasing calcification.
- b. The increase of organic decomposition is accompanied by a decrease in water acidity.
- c. The increase of acidification is accompanied by an increase in respiration.
- d. The increase of water acidity is accompanied by reduced calcification.

81. The colligative properties of solutions depend on

- a. nature of solvent
- b. nature of solute
- c. volume of solution
- d. number of solute particles

82. The density of pure water reaches its maximum value at

- a. 0°C
- b. 4°C
- c. 100°C
- d. 104.5°C

83. The density of pure water at 4 °C in SI (International system) units is

- a. 1000 g/m³
- b. 1 g/cm³
- c. 1000 kg/m³
- d. 1000 kg/cm³

84. On dissolving sodium bicarbonate salt in water, the solution becomes

- a. acidic
- b. basic
- c. neutral
- d. amphoteric

85. The ratio of ozone gas found in the stratosphere to that in the troposphere is

- a. less than 1
- b. greater than 1
- c. equal to 1
- d. the answer cannot be determined

86. What do you expect to happen for the rate of photosynthesis in the plants that are expose to large amounts of ozone gas?

- a. Increases.
- b. Decreases.
- c. Is not affected.
- d. The answer cannot be determined.

87. Which of the following gases causes corrosion of plastics and rubber?

- a. Argon. b. Nitrogen. c. Oxygen. d. Ozone.

88. Nitrogen makes up 78% of

- a. the mass of the atmosphere b. the weight of the atmosphere
c. the volume of the atmosphere d. both (a) and (b)

89. The atmospheric layer preferred for airplanes flight is

- a. troposphere, because it is characterized by horizontal air movement
b. troposphere, because it is characterized by vertical air movement
c. stratosphere, because it is characterized by horizontal air movement
d. stratosphere, because it is characterized by vertical air movement

90. Which of the following statements is true about the ozone gas in the atmosphere?

- a. It causes a decrease in the temperature of mesosphere.
b. It causes an increase in the temperature of thermosphere.
c. It causes a decrease in the temperature of the stratosphere after 20 km.
d. It causes an increase in the temperature of the stratosphere after 20 km.

91. Some animals can dive to a depth of 0.5 km. What is the total pressure they can withstand at this depth?

- a. 0.5 atm b. 1.5 atm c. 50 atm d. 51 atm

92. Fluids include substances.

- a. solid and liquid b. solid and gaseous
c. liquid and gaseous d. solid, liquid and gaseous

93. If the freezing point of a pure solvent is 0°C , what will be the freezing point if 5 g of salt is dissolved in it?

- a. Less than 0°C b. Equals 0°C c. Higher than 0°C d. 0°C ; 4°C

94. A liquid has a pressure at any point inside it equal to the of the liquid column above that point acting on the unit area of that point.

- a. density b. volume c. weight d. mass

95. What is the main advantage of the cartilaginous skeleton in fish like sharks?

- a. It provides greater strength. b. It provides greater flexibility.
c. It makes the fish heavier. d. It provides no special advantage.

96. The whales use their in communications, and hunt their preys.

- a. bodies colors. b. sounds. c. big eyes. d. fins.

97. Viper fish has high concentrations of hemoglobin in its blood to adapt to the

- a. lack of oxygen.
- b. high salinity.
- c. high pressure.
- d. darkness.

98. Which of the following distinguishes dolphins from ice - fish?

- a. Streamlined shape
- b. The presence of fins
- c. The presence of gills
- d. The presence of snorkels

99. Which of the following is true about salmon?

- a. Young spend the first period of their lives in the sea
- b. Adult fish reproduce in river waters
- c. Adult fish spend most of their lives in rivers
- d. Young fish migrate from the sea to the river

100. A continuous change between the three states of water on the Earth's surface within a closed system called the cycle

- a. Nitrogenous
- b. Carbonaceous
- c. Oxygenation
- d. Hydrological

101. All the following from the biotic factors in an environment EXCEPT

- a. Animals
- b. Bacteria
- c. Plants
- d. Light

102. It is where living organisms are found on, above, and below the Earth's surface.

- a. Lithosphere
- b. Biosphere
- c. Atmosphere
- d. Hydrosphere

103. It is the process in which water liquid converts into water vapor

- a. Condensation
- b. Transpiration
- c. Evaporation
- d. Precipitation

104. It is the process in which plants release excess water through stomata

- a. Condensation
- b. Transpiration
- c. Evaporation
- d. Precipitation

105. The reason for the polarity of the water molecule is the difference in

- a. electronegativity of its elements
- b. the atomic mass of its elements
- c. the number of covalent bonds between its atoms
- d. the type of covalent bonds between its atoms

106. What is the direct role of transpiration process in the hydrological cycle?

- a. Infiltration through sedimentary rocks .
- b. Condensation of water vapor forming clouds.
- c. Increasing CO₂ gas percentage in the atmosphere.
- d. Increasing the water vapor percentage in the atmosphere.

107. Which of the following sugar solutions has the highest boiling point?

- a. Solution of concentration 10 g/L
- b. Solution of concentration 5 g/L
- c. Solution of concentration 9 g/L
- d. Solution of concentration 1 g/L

108. What is the effect of increasing the number of solute molecules in solution on the boiling point of the solution and its osmotic pressure respectively?

- a. Increases, Increases.
- b. Decreases, Decreases.
- c. Increases, Decreases.
- d. Decreases, Increases.

109. When the temperature of pure water increases from 4 °C to 8°C, what happens to the volume and the density of water respectively?

- a. Increases, Increases.
- b. Decreases, Increases.
- c. Increases, Decreases.
- d. Decreases, Decreases.

110. Which of the following is/are considered a structural adaptation of some oceans fish to withstand the very high pressure?

- a. Presence of large eyes.
- b. Mucus that covers the body.
- c. Compressed bodies.
- d. Large gills.

111. In salmon life cycle, which of the following stages live most of their life in an aquatic environment with high osmotic pressure?

- a. Eggs and young fish.
- b. Adult fish.
- c. Eggs only.
- d. Young fish only.

112. Which two quantities of the following decrease in magnitude with increasing depth in the Red Sea water in summer?

- a. Water density and its pressure.
- b. Water density and its temperature.
- c. Water temperature and its pressure.
- d. Water temperature and light intensity through it.

113. Which of the following values represents the effective velocity of gas molecules that have escaped from the Earth's atmosphere?

- a. 9 km/s.
- b. 10 km/s.
- c. 11 km/s.
- d. 12 km/s.

114. What is the main reason for the aquatic environment pollution?

- a. Floods.
- b. The increased industrial activity.
- c. Migration of aquatic organisms.
- d. Overfishing of aquatic organisms.

Model Answer

*(1) Choose the right answer:

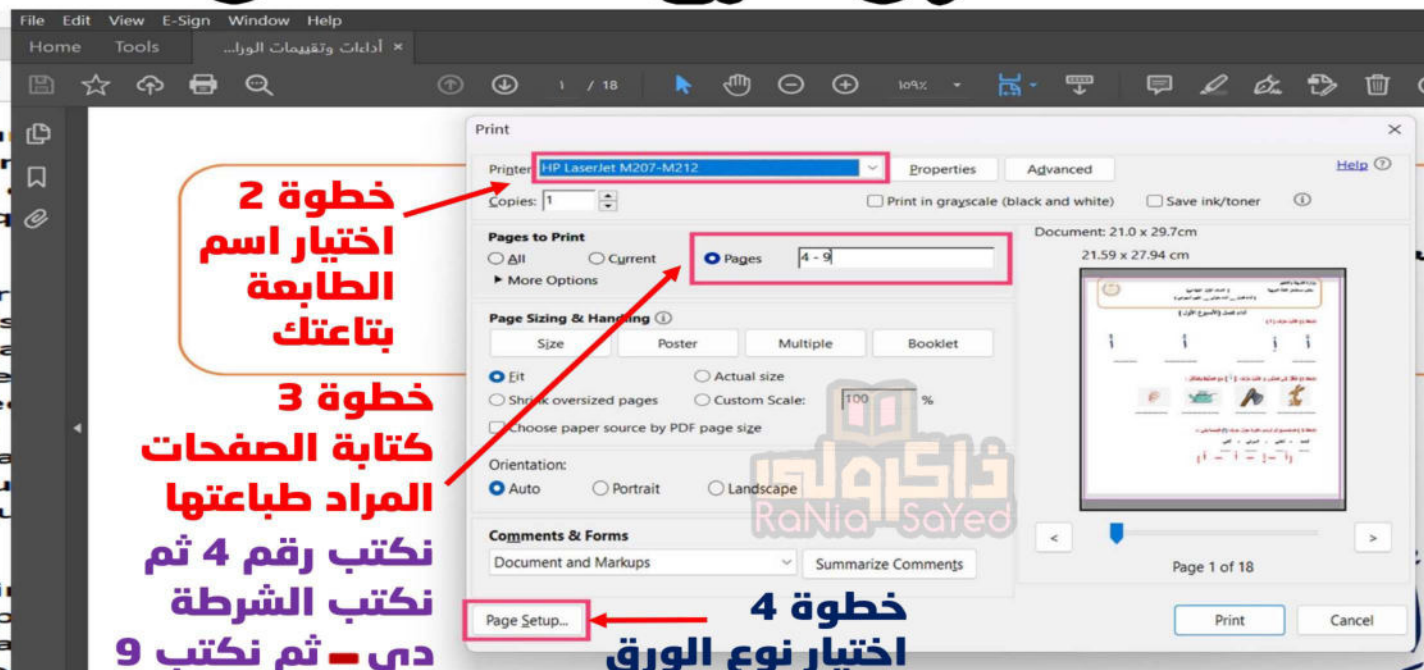
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3. B	16. D	29. B	42. C	55. C	68. D	81. D	94. C
4. C	17. B	30. B	43. A	56. A	69. B	82. B	95. B
5. B	18. A	31. B	44. C	57. A	70. B	83. C	96. B
6. C	19. A	32. B	45. C	58. A	71. A	84. B	97. A
7. D	20. C	33. B	46. C	59. A	72. A	85. B	98. C
8. B	21. B	34. B	47. D	60. A	73. A	86. B	99. B
9. A	22. A	35. B	48. D	61. B	74. C	87. D	100.D
10. B	23. A	36. D	49. A	62. B	75. A	88. C	101.D
11. C	24. D	37. A	50. D	63. D	76. D	89. C	102.B
12. D	25. D	38. D	51. B	64. A	77. D	90. D	103.C
13. D	26. B	39. A	52. C	65. B	78. A	91. D	104.B

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



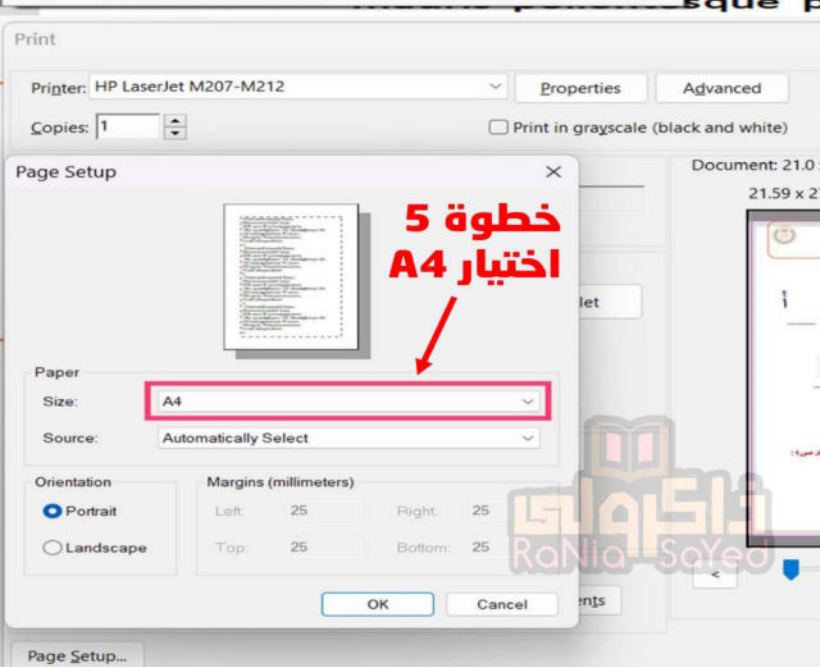
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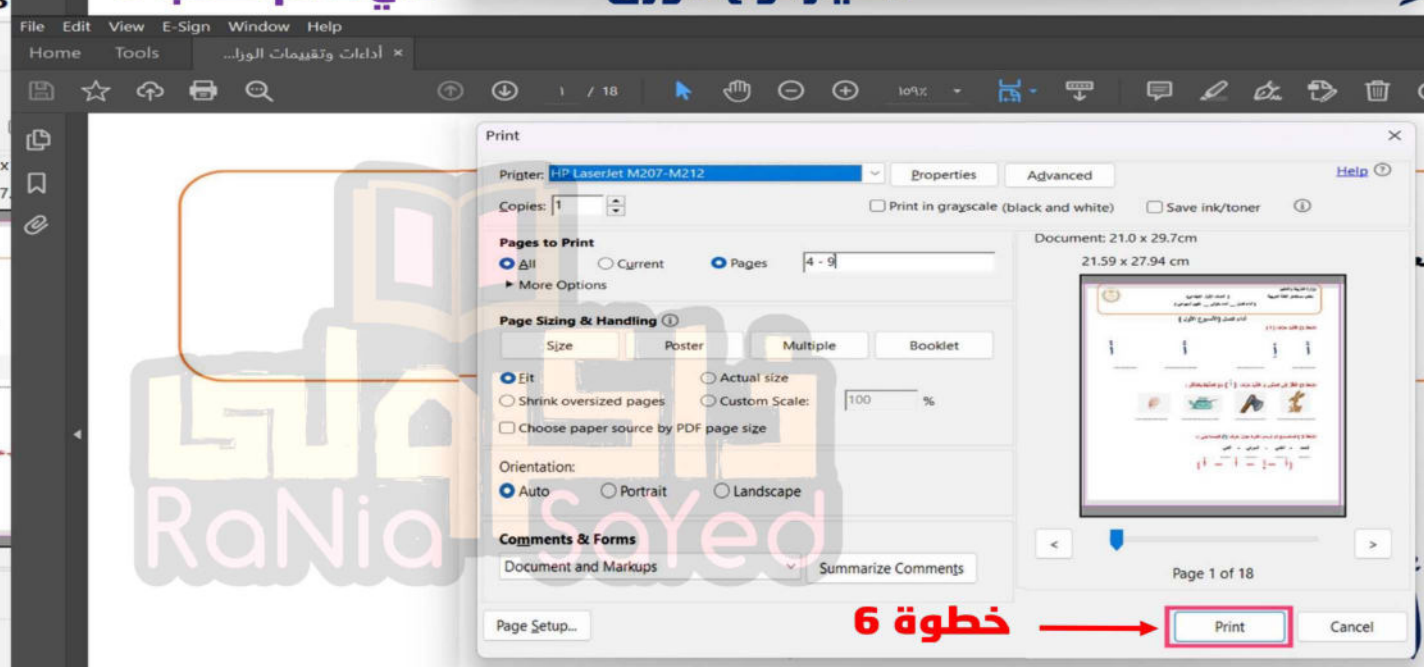
خطوة 2
اختيار اسم
الطابعة
بتاعتك

خطوة 3
كتابة الصفحات
المراد طباعتها
نكتب رقم 4 ثم
نكتب الشرطة
دي - ثم نكتب 9

خطوة 4
اختيار نوع الورق



خطوة 5
اختيار A4



خطوة 6